Machine and Tool BLUE BOOK

A DIGEST OF THE METAL WORKING INDUSTRY

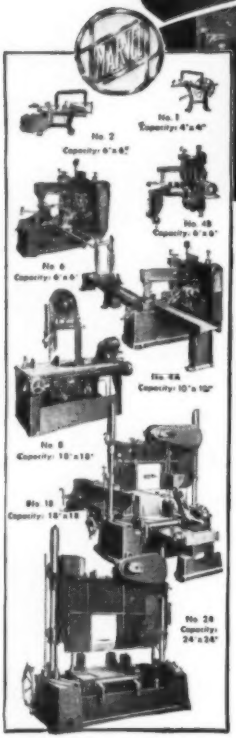
MARCH 1947

THIS MONTH

Machining Magnesium 135
How Ford Salvages Waste.....172
Metal Heat Treating Equipment.....206
Grinding Carbide Millers.....243
Helical Compression Springs.....263
What's New 270
Let's Talk Shop.....315
Available Literature 351
Advertisers' Products Index.....374
Index To Advertisers.....382

COMPLETE INDEX ON PAGE 5

A HITCHCOCK PUBLICATION



No "waiting" cost here!

There are no costly delays, no men and machines standing idle, waiting for stock to be cut off from bars, when the stockroom is equipped with a No. 6A or 9A MARVEL High Speed Sawing Machine.

These **fast,** all-ball-bearing high speed saws will cut off accurate lengths or slices at almost unbelievable speed. Equipped with an automatic bar push up, they will cut identical pieces from single or nested bars automatically, with no more operator attention than an automatic screw machine. Still, at any point, the automatic operation can be interrupted, a miscellaneous cut made, and the "production" run resumed by simply re-engaging the bar feed. A single MARVEL Automatic can keep well ahead of a large machine shop, increasing the earning time on all machines.

There is a MARVEL Saw for every need—in every capacity range and price class. Your local MARVEL Sawing Engineer will gladly study your metal sawing problems and requirements and make recommendations as to methods and equipment.

Send for Catalog

ARMSTRONG-BLUM MFG. CO.

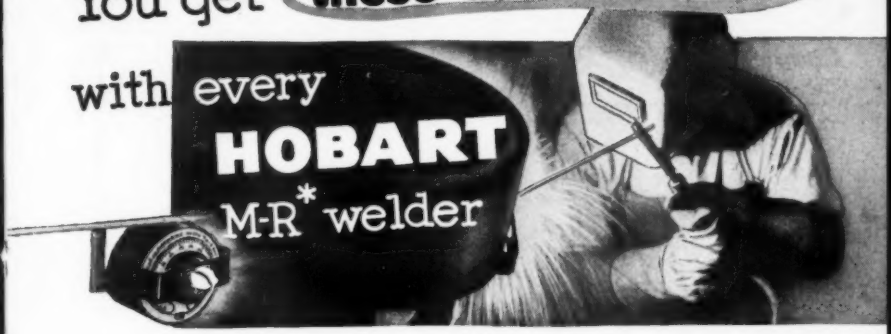
"The Hack Saw People"

5700 Bloomingdale Ave. Chicago 39, U. S. A.

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

MARVEL SAWS

You get these advantages with every HOBART M-R* welder



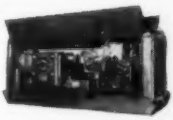
remote control *(exclusive with Hobart)* is yours at no extra cost

This ingenious feature encourages every operator to do his **very best** work—by making it **easy** to adjust his welding heat to suit every job, regardless of size or shape of work, type of electrode, or position of the weld.

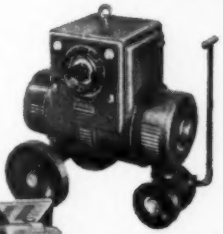
***multi-range-dual-control** provides ten (10) ranges of welding current—with one hundred (100) fine adjustment steps in **each** range subject to remote control. One thousand (1,000) combinations of current and voltage—an advantage not offered in ordinary welders. Put Hobart on your job, and you'll know **real** high-quality, low-cost welding. Mail the coupon below to:

HOBART BROTHERS CO., Box TB-37, TROY, OHIO

One of the World's Largest Builders of Arc Welders

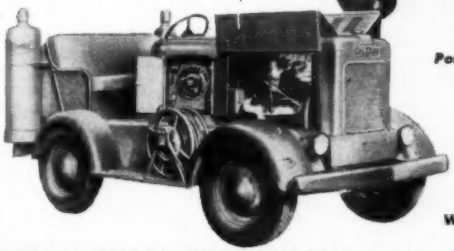


Gas Drive Welder



Portable Electric Welder

"Build Your Own"



Hobart Weldmobile

Hobart Electrodes assure you of uniformly high quality performance under all conditions — in the shop or in the field. Check coupon at right for information.

Hobart Brothers Co., Box TB-37, Troy, Ohio

Without obligation, tell me more about Hobart's multi-range-dual-remote-control — and other weld-improving features. I'm interested in:

☐ Electric Drive ☐ Gas Drive ☐ Electrodes ☐ Accessories

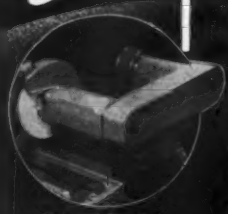
NAME _____ POSITION _____

FIRM NAME _____

ADDRESS _____

Designed for EFFICIENCY

TO PRODUCE MORE OF A GREATER VARIETY THRU EASE OF PRECISION SET UP AND OPERATION



External Bracket

The Rivett No. 104 is a simple, power-driven grinder suitable for tool making and precision manufacturing. Operations of widely varying nature can be quickly set-up and efficiently ground on one or many pieces. Interchangeable brackets are selectively mounted on the cross slide for internal, external, or concentric grinding in straight, taper, face or shoulder form.

Internal, External Turret

RANGE

Internal spindles of suitable design and speed may be selected for hole grinding up to approximately 3" diameter and 4" length.

External bracket with 7" x ½" wheel may be used for on-center or chucked work up to approximately 3" diameter.

Turret for concentric grinding of hole or outside surface is limited to such work as may be chucked.

RIVETT

RIVETT LATHE & GRINDER, Inc.

BRIGHTON · BOSTON · MASS. · U. S. A.

Write for Bulletin 104.

HARDINGE
ELMIRA, N.Y.

HIGH SPEED PRECISION LATHE

for Rapid, Accurate Work in Tool Rooms, Laboratories and Development Departments

The problem today is to produce parts to exacting close tolerances at low cost. The DV 59 Hardinge High Speed Precision Lathe has the perfect combination of accuracy and speed together with rugged construction so necessary for lasting precision. Simplicity of operation enables relatively unskilled operators to produce parts to close limits.

Optical accuracy is now necessary for industry generally — that is why the Hardinge hardened and ground steel dovetail bed construction, standard for special accuracy lathes for the optical industry, is now featured for Hardinge precision lathes. Write for Bulletin DV 59 which presents full particulars about this greatest advance in precision lathe construction.

SPECIFICATIONS

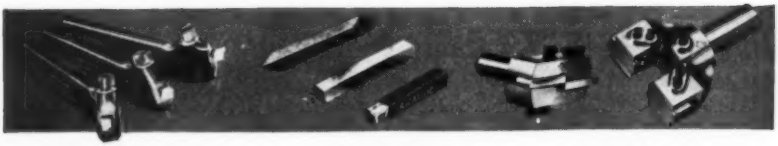
1" collet capacity, 9" swing, 17" center distance, 8 spindle speeds up to 4000 r.p.m.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

ARMSTRONG

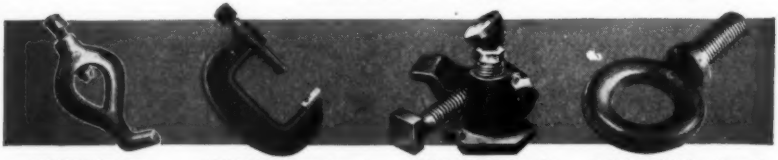
Quality TOOLS



ARMSTRONG TOOL HOLDERS
Permanent, multi-purpose tools, for every operation on Lathes, Planers, Slotters and Shapers.

ARMSTRONG HIGH SPEED
Ready-to-grind Bits... Ground Cutters.
ARMALOY Cast Alloy CUTTER-BITS
ARMIDE Carbide-Tipped CUTTERS
6 cutter shapes, 12 sizes—2 grades.

ARMSTRONG Turret Lathe and Screw Machine TOOL HOLDERS
Drill Holders, Cutter Holders, Finishing and Knurling Tools for standard operations.

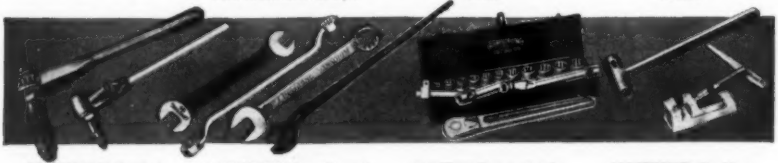


ARMSTRONG Drop Forged DOGS
Lathe Dogs, Milling Machine Dogs, and Clamp Dogs. 12 types, all sizes.

ARMSTRONG Drop Forged "C" CLAMPS
Heavy Duty, Medium Service, Deep Throat, and Tool Makers' types in all sizes. Also Machinists' Clamps.

ARMSTRONG Setting Up Tools
A complete line of Drop Forged Strap Clamps, Planer and Bracing Jacks and T-slot Bolts.

ARMSTRONG Drop Forged Eye Bolts
Plain or shoulder pattern. Blank or Threaded. 14 sizes, Drop Forged and heat treated.



ARMSTRONG Ratchet Drills
All steel wearing parts hardened. Packer, Railroad, Standard, and Short types, both plain and reversible.

ARMSTRONG Drop Forged Wrenches
Both Carbon and Alloy Steel. Over 100 types in all sizes. Improved designs, steels, and heat treating ... stronger.

ARMSTRONG Detachable Socket Wrenches
All sizes and types with driving handles, extensions, and drop forged ratchets. Sold singly or in cased sets.

ARMSTRONG Machine Shop Specialties
Drill Drifts, Tool Posts, Drill Holders, Cutter Grinding Holders, and Tool Makers' Vises.

ARMSTRONG BROS.

Better Pipe Tools. A complete line, each a better tool with hardened, alloy or drop forged parts wherever they will add to strength or tool life.

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
300 N. FRANCISCO AVE. CHICAGO 12, U. S. A.
Eastern Whse. and Sales 199 Lafayette St., New York 12, N. Y.
Pacific Coast Whse. and Sales Office. 1275 Mission St., San Francisco 3, Calif.

Published Monthly

Machine and Tool BLUE BOOK

Volume 43, No. 3

MARCH, 1947

William F. Schleicher
Editor

R. C. Van Kampen
President

J. E. Hitchcock
Vice President

M. L. Yonts
Secretary

Vincent C. Hogren
Business Manager

Robert R. Hadley
Art Director

C. E. Elzinga
Circulation Manager

Featured in this issue....129
As the Editor Sees it....131
Machining Magnesium....135
How to Grind Carbide Tools....153
By H. A. Frommelt
How Ford Salvages Waste....172
Letter from England....181
Precision Measurement....190
By Warren Baker
Metal Heat Treating Equipment....206
By Gordon Wheeler
The Significance of Current Trends in Prices, Wages and Productivity....230
By Ewan Clague
Modern Centerless Grinding Practice....243
By D. E. Lower
Twelve Tons of Chips From One Set-Up....261
Design of Helical Compression Springs....263
By Edward J. Rantsch, M.E.
What's New in Metalworking....270
Shop Hints....297
Piercing Small Holes....297
By Frederico Strasser
Automatic Welding of 13-Foot Grain Elevator Bin Hopper....299
Removal of Copper Brazed Inserts....300
Let's Talk Shop....315
Available Literature....351
New Technical Books....353
Mechanics Through the Ages....360
Products Index....374
Index to Advertisers....382

CCA

District Managers

New England and N. Y. State: W. E. Hoffman, Portland, Conn., Phone 2946
New York, Metropolitan Area: A. E. Wailes, 55 W. 42nd St., New York 18, N. Y., Phone Lackawanna 4-4528
Pennsylvania and South Atlantic States: E. A. Dunhom, 6488 Lawnton Street, Philadelphia 28, Pa., Tel. Roxboro 8-1189-J
Michigan: John A. Wright, 8630 W. Outer Drive, Detroit, Mich., Tel. Evergreen 6140
Ohio, Indiana, Kentucky: H. J. Smith, 542 S. Dearborn St., Chicago 5, Ill., Phone: HARrison 6040
Middle West: James C. Stuart, Otto Highfield, 542 S Dearborn St., Chicago 5, Ill., Phone: HARrison 6040
Pacific Coast: R. H. Deibler, 2506 W. 8th St., Los Angeles 5, Calif. Phone: Federal 0303

(Copyright 1947, by Hitchcock Publishing Co., Chicago 5, Ill.)

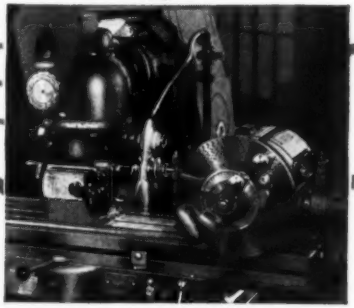
Phone: HARrison 6040 Cable Address: HITCHPUB

WITH THESE ATTACHMENTS YOU CAN ASSIGN MORE JOBS

Here a High Speed Universal Milling Attachment, supported by an individual crane, is mounted on a CINCINNATI No. 2 MI Miller.

to your Cincinnati Millers!

CINCINNATI

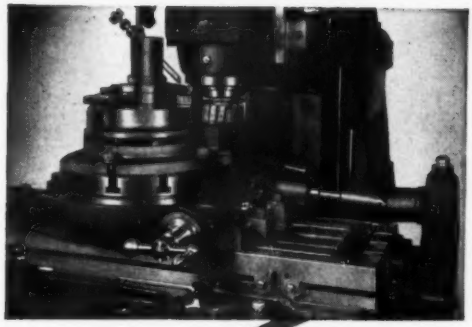


Universal Spiral Milling Attachment and Dividing Head equipped with Wide Range Divider. These attachments have an exceptionally wide range of uses.

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U. S. A.

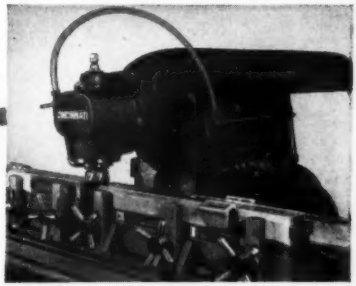
MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES



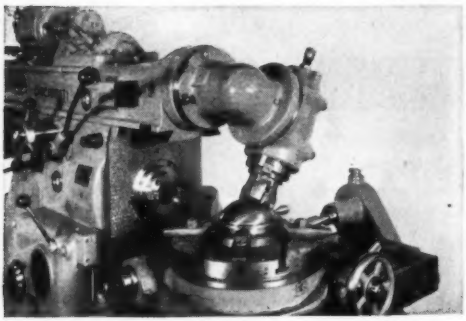
Left: Circular Milling Attachment with power feed drive. For circular milling operations. May also be tooled up for continuous milling. 16", 20" and 24" sizes available.

Above: Milling a fixture part held in a No. 5 Plain Vise. Vise jaws may readily be changed to special designs suitable for the work. Swivel, Toolmaker, and All-Steel Vises also available.

● Here are six of the thirty-five different standard milling attachments offered by CINCINNATI to simplify tooling; improve methods handle a different type of operation; raise quality; lower unit costs; step up production; minimize equipment costs. Attachments may be purchased with machines or as an afterthought—i.e., most of them are not "built-in" but may be obtained as the need arises. ¶ All types and styles of CINCINNATI Milling Attachments are illustrated and described briefly in attachment circular M-1382-1. Write for your copy.



Above: Heavy Vertical Milling Attachment. Does the work of a vertical machine. Spindle head may be swiveled 45° right and left.



Left: Motor Driven Universal Milling Overarm Attachment on a CINCINNATI Dial Type. Always ready to use; convenient for frequent changes in setups.

THIS SAFE LUBRICANT PREVENTS SCORING

use CMD

Anti-Scoring LUBRICANT

Whether you use it on a center or a tool post screw, you will be convinced CMD Anti-Scoring Lubricant is a *safe, sure, economical* lubricant to use. It withstands pressures of more than 50,000 pounds per square inch and prevents any metal to metal contact.

Why not send for a test sample today? Your own test will prove it best.

MAIL COUPON FOR *FREE* SAMPLE

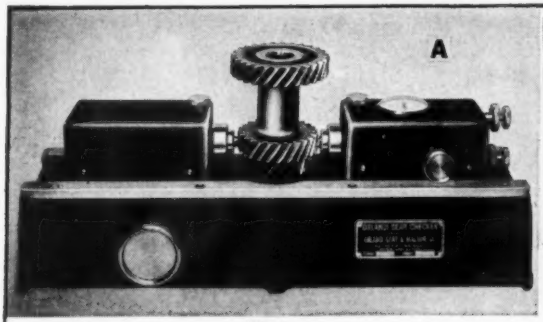
CHICAGO MANUFACTURING & DISTRIBUTING CO.
Dept. 3BB, 1928 West 46th St., Chicago 9, Ill.

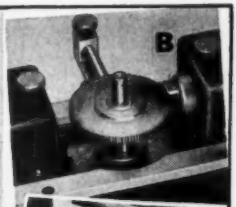
Without obligation, please send us a free sample kit of one tube of CMD Center Point Lube and one tube of CMD Center Point Oil. Also, send Catalog describing CMD Helical Groove Centers.

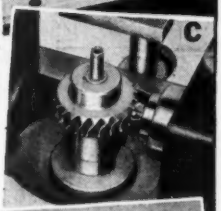
NAME.....

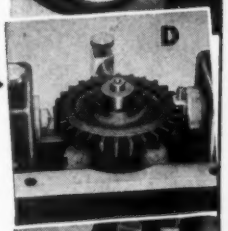
FIRM NAME.....

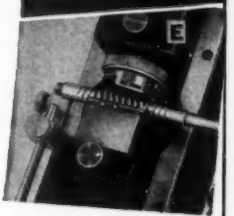
ADDRESS.....











THE REVOLUTIONARY

ORLANDI ★

GEAR CHECKER

FAST – ACCURATE – SIMPLE
CHECKS SPUR & HELICAL GEARS WITH PINS & BALLS

Production & Precision!

HERE'S WHAT IT CHECKS

1. P. D. of spur and helical gears (A)
2. Concentricity without master (B)
3. Concentricity and sizes of worm gear with ball (C)
4. Tooth spacing (D)
5. Backlash (D)
6. Parallelism
7. P. D. of any thread form with 3 wires (E)
8. Diameter of gear and worm blanks
9. Plug gages, arbors, etc., as a comparator

It's easy to convert the Orlandi to check P. D. with 3 wires

ORLANDI ★
GEAR & MACHINE CO.
16195 MEYERS ROAD
DETROIT 27, MICH.

WRITE FOR OUR CATALOG

The Prutton TAPMASTER

3 TAPPING MACHINES IN 1

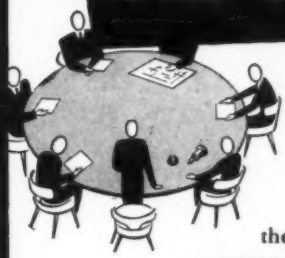
Speedy; can do three jobs at once, tapping any size hole up to 7/8". Three separate motors. Single or continuous cycle. Positive feed by husky lead screw prevents tearing of threads. Safe—no jamming of work. Ample tanks for coolant oil—ready accessibility. Descriptive bulletin. 3/4" pipe cap; 1500 per hour on Tapmaster.

WRITE FOR . . . 3/4" pipe cap; 1500 per hour on Tapmaster. *. . . DESCRIPTIVE BULLETIN*

D. H. PRUTTON MACHINE & TOOL CO.

5295 W. 130th St. CLEVELAND 11, OHIO

Bring your Machining problems to the "Gisholt Round Table"



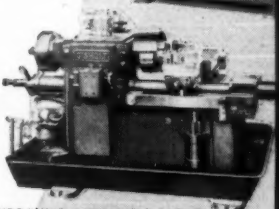
An organization learns a lot in 50 years of building and using machine tools. At Gisholt, this store of experience—symbolized by the Gisholt Round Table—represents thousands of problems successfully solved for thousands of users.

The answers to your problems, too, may be found at the "Round Table"—answers that will help you find better, more economical methods of machining round or semi-round parts.

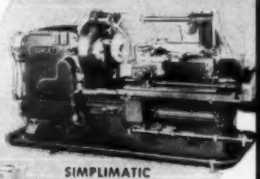
Whether your interests lie in small lots or large volume production—or in further refinements through balancing or Superfinishing—Gisholt's specialists in these fields are ready to collaborate with you—to give you their unbiased judgment on the methods and equipment best suited to your individual needs.

BALANCERS

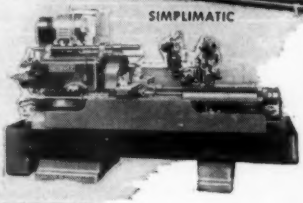
SUPERFINISHERS



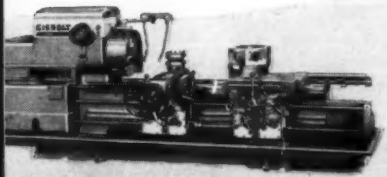
HYDRAULIC AUTOMATIC LATHES



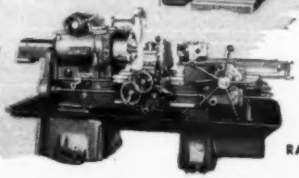
SIMPLIMATIC



FASTERMATIC



SADDLE TYPE TURRET LATHES



RAM TYPE TURRET LATHES

GISHOLT MACHINE COMPANY

Madison 3, Wisconsin

New...

HARD-CASE BLUE-TEMPER TREATMENT

Prolongs Cutting Life of RELTOOL "SHOCKLESS" Center Drills

The exclusive "SHOCKLESS" design which reduces tip breakage is augmented by an additional, special heat treatment which produces a superficial "HARD-CASE" .0002 to .0005 deep, and which "Rockwells" 68 to 78 "C" scale. A follow-up "BLUE-TEMPER" Treatment removes any interior strains, leaves the tool with a distinctive blue finish, prolongs the life of the cutting edges from 25 to 300%.

New, WIDE OPEN FLUTES on all Reltool "SHOCKLESS" and "Standard" Center Drills provide for Fast, Positive Chip Clearance.

END MILLS by RELTOOL

In a Full Range of Styles and Sizes

They "round out" the Reltool line of dependable metal cutting tools. Precision made of finest, high-speed tool steel, they are scientifically heat treated and case hardened for long life. Retool with RELTOOL! *Write for bulletins on the Complete Reltool Line of Circular Saws and other Metal Cutting Tools.*

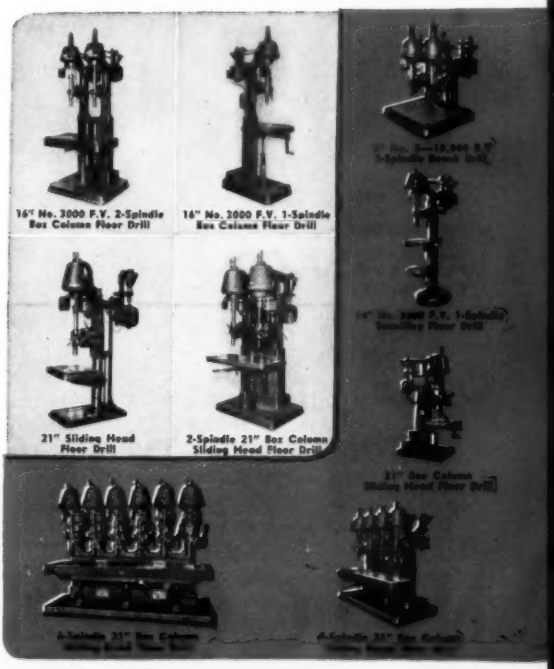
Reltool CORPORATION
RELIABLE METAL CUTTING TOOLS

710 WEST MICHIGAN STREET • MILWAUKEE 3, WISCONSIN

DRILL PRESSES by Canedy-OTTO

C THE WORLD OVER O

WORLD'S MOST COMPLETE DRILL PRESS LINE


16" No. 3000 F.V. 2-Spindle Box Column Floor Drill
16" No. 3000 F.V. 1-Spindle Box Column Floor Drill
21" Sliding Head Floor Drill
2-Spindle 21" Box Column Sliding Head Floor Drill

Drill presses, bearing the familiar CANEDY-OTTO name, are found in factories the world over — testifying to the world-wide, long-time acceptance of CANEDY-OTTO, "The World's Most Complete Drill Press Line." Before you specify or approve any drill press purchase, make a careful review of the CANEDY-OTTO line — a line providing an economical, standard unit for a very wide range of drilling requirements. Write us today for catalog, putting detailed information on the complete CANEDY-OTTO Drill Press line at your fingertips.

CANEDY-OTTO MFG. CO. CHICAGO HEIGHTS, ILL.

For That Extra Edge In Production

Check these 8 facts now...about NELCO

Carboloy-Tipped Side Milling Cutters for Straddle Milling, Half-Side Milling and Slotting

- ☐ AT *NEW* REDUCED PRICES EFFECTIVE AT ONCE!
- ☐ Mill up to 20 times *faster!*
- ☐ More pieces between grinds—with *finer* finish!
- ☐ *All-Alloy Steel* Bodies!
- ☐ Thicker, Sandwiched-Brazed, Precision-Ground Tips!
- ☐ Copper or Cadmium Plated for easy job identification and to prevent rust!
- ☐ Sizes 3" to 8" dia., ⅛" to 1" width — *available in stock!*
- ☐ Shipped individually protected by special plastic coating!

On Request!

Your copy of this new 28-page catalog illustrating and describing the complete line of Nelco Carboloy-Tipped Cutting Tools. Includes valuable engineering data and price lists. Send for it today.

NELCO TOOL CO., INC.

For That *EXTRA EDGE* In Production

Executive Offices and Plant

370 Hamilton Avenue, Dept. 3, Brooklyn 31, N. Y.

Any One of These Well Known Distributors Will Be Glad To Serve You

Albany—Sager-Spuck Supply Co., Inc.
Baltimore—L. A. Benson Co., Inc.
Bridgeport—Hawley Hardware Co.
Brooklyn—A. N. Nelson, Inc.
Buffalo—Beals McCarthy & Rogers, Inc.
Cambridge—Robert E. Morris Co.
Chicago—Irving A. Hecht & Assoc.
Cleveland—J. W. Mull, Jr.
Detroit—B-H Tool and Supply Co.
Detroit—Booth & Shaw
Indianapolis—J. W. Mull, Jr.
Los Angeles—Murphy-Denis Corp. of Cal.
Monroe, N. C.—Tool Service Engineer's Co.
Kearny—A. N. Nelson, Inc.
Hartford—Silliter-Holden, Inc.
Philadelphia—Carey-McFall Co.
Pittsburgh—J. W. Mull, Jr.
Providence—Providence Mill Supply Co.
Rochester—Beals McCarthy & Rogers, Inc.
Syracuse—A. V. Wiggins & Co.
Toledo—J. W. Mull, Jr.
West Hartford—Robert E. Morris Co.
Worcester—Brierly, Lombard & Co.
York, Pa.—L. A. Benson Co., Inc.

TORQOMATIC

A UNIVERSALLY ADAPTABLE TORQUE-DRIVEN TOOL... BY *Jarvis*

The most advanced tapping attachment . . . in design . . . in trouble-free performance . . . in ease of operation. It is ultra sensitive . . . produces high quality threads . . . operates without pressure on the tap . . . produces more tapped holes per hour . . . saves taps. The JARVIS TORQOMATIC is the most efficient tapping attachment developed to date and is, therefore, the most economical.

Ask for the well-illustrated, fully descriptive folder on JARVIS TORQOMATICS. It shows you how to increase quality production at lower cost. WRITE TODAY, Dept. 32 Jarvis Power Tools, Middletown, Connecticut.

The CHARLES L. JARVIS Co.

MIDDLETOWN, CONNECTICUT

TAPPING ATTACHMENTS • FLEXIBLE SHAFTS AND MACHINES
GROUND ROTARY FILES • QUICK CHANGE CHUCKS AND COLLETS

PICK THIS BLADE to Saw Tough Alloys

For cleaner, more accurate power machine cutting of hardest alloy steels — stainless, chrome, nickel, etc. — the Griffin High Speed Steel Blade is your best buy. 18-4-1 tungsten high speed steel, specially Griffin-tempered, with specially milled teeth. Made also in hand frame sizes.

OTHER GRIFFIN BEST BUYS

For most economical general power machine use, pick the GRIFFIN SPECIAL ALLOY molybdenum high speed steel blade . . . For utmost flexibility plus toughness in a hand frame blade pick the improved NEW GRIFFIN . . . For hand sawing thinnest sheet or tubing without tooth breakage, pick the GRIFFIN NON-STRIP . . . For precision contour sawing pick GRIFFIN BAND SAWS; choice of hard-edge-flexible-back, spring-temper, skip-tooth and wood-cutting types.

Ask your distributor for Griffin Blades. For latest 20-page Griffin Price List write us.

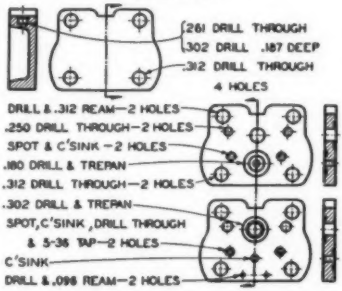
GENERAL SALES AGENT
JOHN H. GRAHAM & CO., Inc.
105 DUANE ST. NEW YORK 8, N. Y.

GRIFFIN
HACK SAW BLADES *and* BAND SAWS

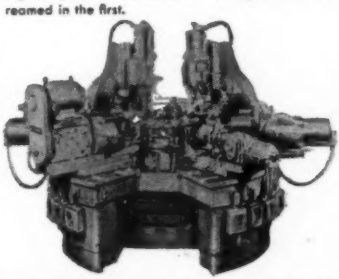
MADE BY G. W. GRIFFIN CO., FRANKLIN, N. H.
Hack and Coping Saw Blade Specialists Since 1880

Multiple Drilling for High Production

Problem Machine cast iron cylinder heads (left) and opposite faces of valve plates (right)

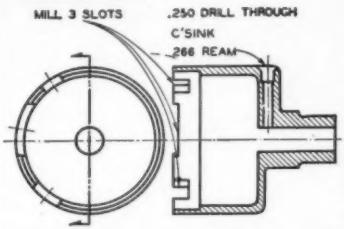


Method ONE 27 SPINDLE AUTOMATIC indexing machine with eight duplicate fixtures performs the operations on either part. Each valve plate is completed in two chuckings. Accuracy is insured by locating the plate in the second chucking from holes reamed in the first.

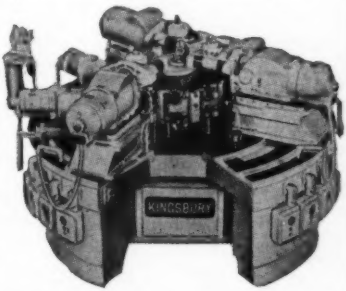


Results 400 PIECES PER HOUR GROSS with one operator, economies in handling, floor space and quality control. These savings reduce the unit cost enough to pay for the machine in a short time.

Problem Machine cast iron distributor bases as shown



Method MILLING AND DRILLING OPERATIONS are combined on this seven-spindle automatic indexing machine. Three of the seven standard drilling units have standard milling attachments. The long hole is drilled in three steps to reduce the time cycle.



Results 480 PIECES PER HOUR GROSS with one operator

If you have high production work involving multiple drilling operations requiring up to 5 H. P. each, we can design, build and tool automatic machinery to solve your problems. Send us your prints showing the operations and hourly production and ask for proposals.

KINGSBURY MACHINE TOOL CORP., KEENE, N. H., U. S. A.

Kingsbury

You Can Count On Custom Built Air Cylinders By Fenn

Fenn custom-built air cylinders can be made to do any reasonable job you want them to do (and in some cases the jobs need not be so reasonable at that). No longer do machine designers and production men have to fit their machines and jigs to standard air cylinders; air cylinders can be made to do what YOU want them to do, when you want them to do it, and how. FENN engineers have licked every special problem they have faced.

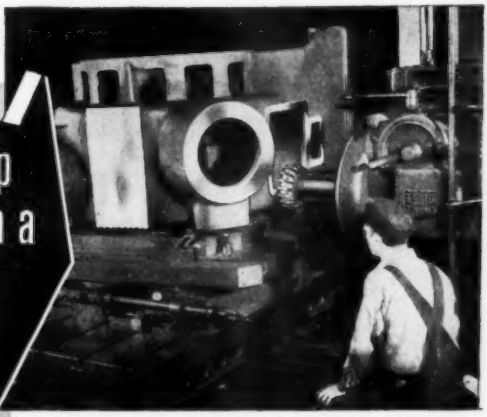
FENN engineers can lick your problem, too. They will take the conditions that face you and design an air cylinder that will give you a performance that meets every exacting requirement of efficiency and economy within budgeted space and at available pressures . . . all at a price just a fraction above the cost of standard cylinders. Orders are accepted in any quantity from one to a thousand or more. Delivery is fast. Write us (Dept. G) about your problems.

Fenn Custom-Built air cylinders are made of carefully selected materials by painstaking workmen.

The FENN Manufacturing Company

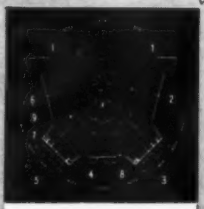
HARTFORD • CONNECTICUT

Large compressor crankcase placed on a rotary table to speed overall machining time on a G. & L. machine.



Quick Set-Up of this Part on a G&L

MAKES THIS JOB PROFITABLE



Outline drawing of compressor crankcase showing different index stations. Heavy lines indicate finish surfaces.

Machine Equipped With Rotary Table Simplifies Difficult Work Handling—Indexing Presents All Surfaces for Precision Machining

Only one work setting is required to machine six different surfaces of this large casting. The indexing feature of the rotary table on a G. & L. eliminates unclamping, then reclamping for each operation and each position. This method of handling increases overall machining accuracy and profitably cuts handling time.

This part is set up on the rotary table ready for machining in approximately 15 to 20 minutes. Overall machining time varies from 6½ to 7 hours, depending upon the condition of the casting.

Similar speed-ups in handling your own work may be easily effected by using time-saving accessories and attachments on your Giddings & Lewis horizontal boring, drilling and milling machine. Ask G. & L. engineers

SEQUENCE OF MACHINING OPERATIONS

After each operation the Rotary Table will be indexed.

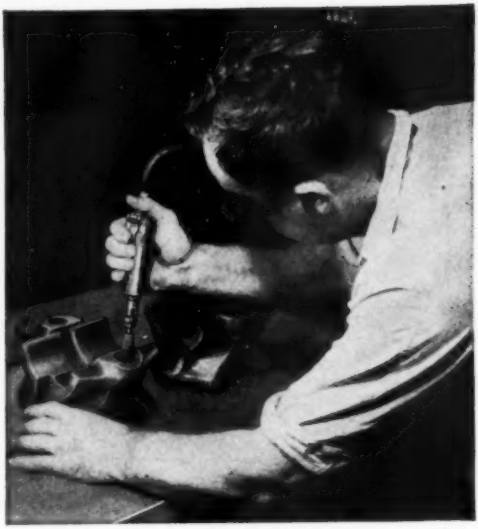
1. **Mill** Base.
2. **Mill** first flange for cover plate opening.
3. **Mill** first 19" cylinder connecting surface.
4. **Mill** 12¼" pad.
5. **Mill** second 19" cylinder connecting surface.
6. **Mill** second flange for cover plate opening.
7. **Bore**, rough and semi-finish second 12.750" opening.
8. **Bore**, rough, semi-finish and chamfer first 12.750" opening.
9. **Bore**, finish and chamfer second 12.750" opening.

Giddings & Lewis MACHINE TOOL CO.

144 DOTY STREET • FOND DU LAC, WIS.

For all types of

ROTARY FILE WORK



CP-3010 Pneumatic Die Grinder, equipped with tungsten carbide rotary file, being used for high-speed burring of steel castings.

The extremely fast and smooth operation of Rotary Files, powered by small CP Pneumatic Die Grinders, will greatly reduce your burring costs.

Compact, small and light, CP Pneumatic Die Grinders have perfect balance, while their rotary operation insures a vibrationless flow of power. Invaluable for a multiplicity of uses, these CP Die Grinders are furnished with numerous handle and throttle designs, as well as spindle extensions and adapters, to meet specific requirements. CP rotary air motors always run cool, and cannot be harmed by overloading.

SPECIFICATIONS — *Over-all lengths of 5⅞", 9" and 12¼". Extension spindles 14" and 27". Wheel capacities up to 2½" in diameter. Weights, 1¼, 3 and 3½ pounds.*

These versatile rotary tools can also be used with drills, steel cutters, mounted points, wire wheels, polishers, and other attachments. Write for full information.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

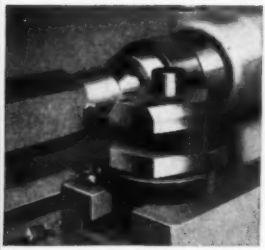
AUTOMOTIVE SERVICE EQUIPMENT • PNEUMATIC TOOLS • ELECTRIC TOOLS • IMPACT WRENCHES
FENDER IRONS • PNEUDRAULIC PUMPS • CYLINDER SLEEVE AND VALVE GUIDE PULLERS

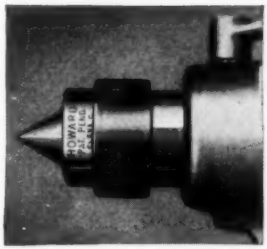
Rockers are all right!

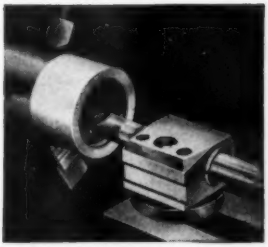
but when your tool posts begin to rock . . . it's time to switch to the

HOWARD *Method of* SUPPORT

HOWARD TOOL HOLDERS
• Height adjustment ring • Rigidity — accuracy — versatility • All sizes and models for bench lathes to roll lathes

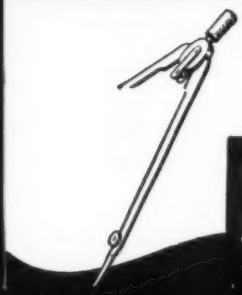






HOWARD LIVE CENTERS
• Back up ring for rigidity • Thrust spring for high loads • Reground or reconditioned for nominal charge • Pre-loaded and ground for accuracy

HOWARD COMBINATION HOLDERS for boring and cutting off • Rigid height adjustment • Full length bar and blade clamp • Holders in 6 sizes



HOWARD DEARBORN, *Inc.*
3370 West 140th Street, Cleveland 11, Ohio

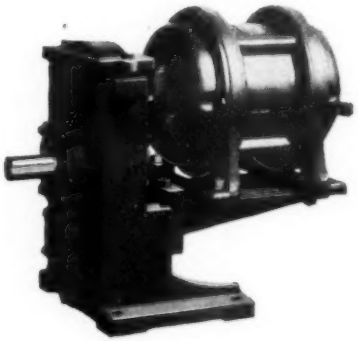
HERE'S HOW...

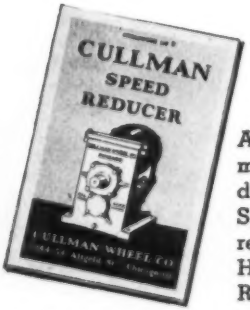
TO GET MORE PRODUCTION FROM EXISTING MACHINES

CULLMAN *Speed* REDUCERS

ADAPT ELECTRIC MOTORS TO SLOWER OPERATIONS

New Low-speed Range
For Motors ¼ To15 h. p.
Fit Speeds To Job Needs



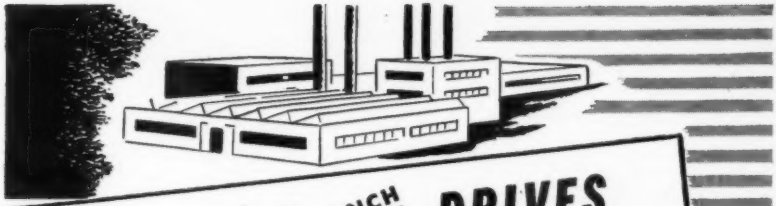


Any standard electric motor can be adapted for many new uses by adding a Cullman Speed Reducer. Compact, dependable, efficient—Cullman Speed Reducers are made in single and double reduction types. Cullman units are equipped with Helical Gears, Roller Bearings, Sprockets and Roller Chains all operating in oil. *Installation is simplified by convenient motor mountings.*

WRITE FOR YOUR COPY...

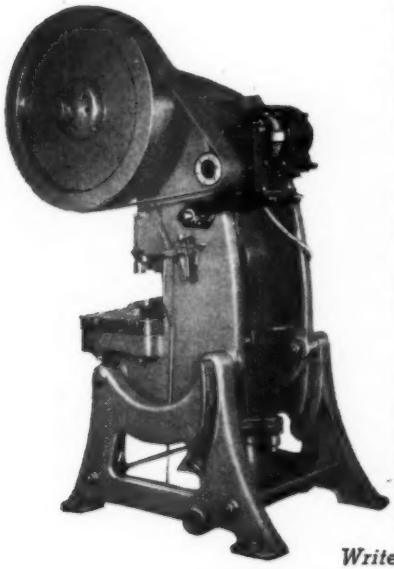
Get the facts! Ask for this helpful booklet which contains much useful data and facts for buyers. It describes Cullman Speed Reducers and other Cullman products.

CULLMAN
1350 Altgeld Street



CULLMAN PUNCH PRESS DRIVES

INCREASE MACHINE EFFICIENCY AND OUTPUT



Offset rising production costs by equipping your punch presses with Cullman unit drives. Output of old equipment can be stepped up *at low cost.* 1800 r.p.m. motors can be adapted to best advantage.

Individual Cullman Drives assure top production flexibility and greater capacity. Other profitable advantages include more efficient floor layouts, better lighting and other conveniences.

Cullman Punch Press Drives are economical—built for heavy-duty and long life. They pay for themselves quickly with actual time savings and extra capacity. Cullman units are made for motors of from ¼ to 7½ h.p.

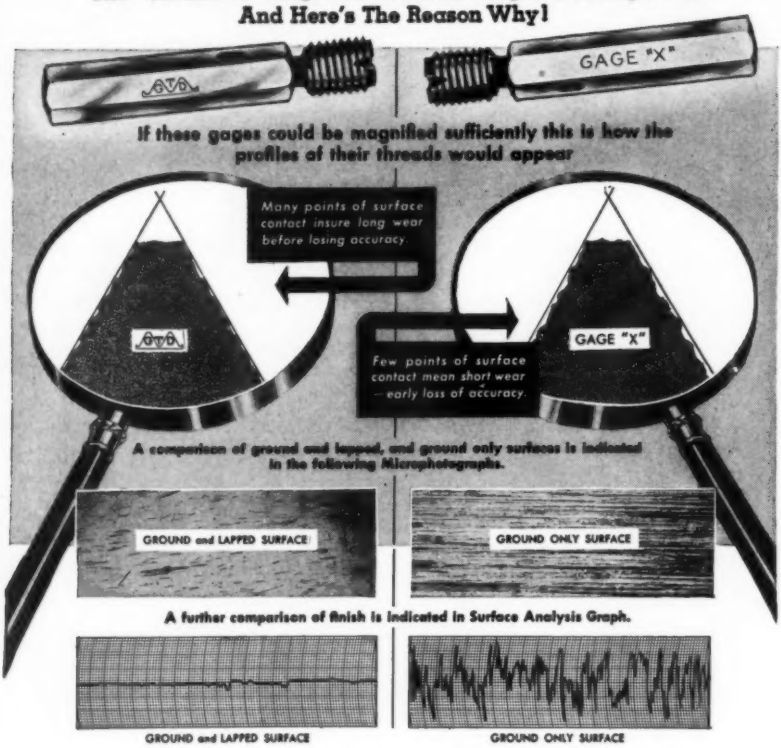
Write for full information TODAY!

WHEEL COMPANY

Chicago 14, Illinois

They Look Just The Same, BUT....

The "Greenfield" Gage Will Outwear Gage "X" Many Times. And Here's The Reason Why!


GAGE "X"
If these gages could be magnified sufficiently this is how the profiles of their threads would appear
Many points of surface contact insure long wear before losing accuracy.
GAGE "X"
Few points of surface contact mean short wear — early loss of accuracy.
A comparison of ground and lapped, and ground only surfaces is indicated in the following Microphotographs.
GROUND and LAPPED SURFACE
GROUND ONLY SURFACE
A further comparison of finish is indicated in Surface Analysis Graph.
GROUND and LAPPED SURFACE
GROUND ONLY SURFACE

Both gages will pass all measurement requirements. But the "Greenfield" Gage, because of its finely lapped surface, will outwear the other many times. *All* "Greenfield" Gages are lapped to an extremely high degree of finish. This "inbuilt" extra wear which gives long and accurate service and better value to users, is one reason for "Greenfield's" reputation in the gage field. *For better gaging, "GO" Greenfield.*

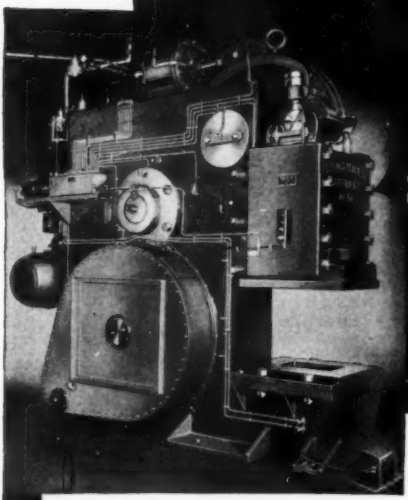
GTD Greenfield 75th YEAR

GREENFIELD TAP and DIE CORPORATION · Greenfield · Massachusetts
and its New Haven Division The GEOMETRIC TOOL COMPANY

HEAVY INDUSTRIES

Here's

- **SHEARING**
- **PUNCHING**
- **BLANKING**



LEFT: This is a No. 54 Shear — 130" high, 122" long.

— Up To 1200 TON Capacities!

The "Buffalo" line of MILL TYPE SHEARS now enables you to perform **heavier** fabrication jobs than before! In sizes ranging from 250 to 1200 ton capacities, these "Buffalo" giants give you these speed, economy and long life advantages:

1. Large tooling space, open on three sides.
2. Longer power strokes, up to 6".
3. Faster power strokes, up to 35 per minute.
4. Plunger engagements for many types of control features.
5. Rigid, heavy frame; oversize parts.

SIMPLY WRITE us concerning your particular problem, and for full facts on this line.

BUFFALO FORGE COMPANY
161 MORTIMER ST. BUFFALO, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

Mill Type SHEARS

Angular Drilling Simplified

•

With the set-up illustrated, 4 angular holes can be drilled at once with Govro-Nelson Self-Contained Automatic Drilling Units. The number, location and angularity of the holes can be changed by relocating the Units, making the set-up adaptable to different production runs.

Here's a drilling method that may well prove to be the answer to your problem of reducing production costs. It is being adopted so widely that our list of users reads like a directory of America's production industries.

Send for literature giving list of prominent users, together with typical applications covering a variety of drilling jobs.

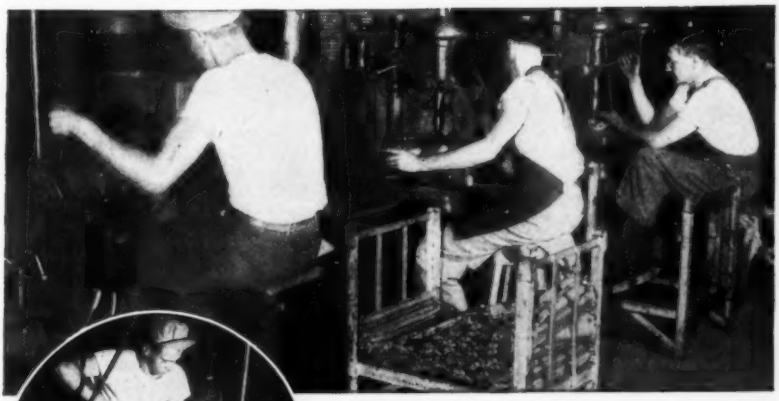
WRITE FOR *Literature*

GOVRO-NELSON CO.
1933 Antoinette
Detroit 8, Mich.

Automatic **DRILLING UNIT**

OUTPUT UP 300%

with Atlas DRILL PRESS "Production Line"



Firm: Cooper Manufacturing Company, Marshalltown, Iowa. **Product:** Power lawn mowers. **Operations:** Drilling holes in cutter bar. Two horizontally mounted drill press heads enable operator to see work clearly and simultaneously countersink both ends of bar. Jigged part then goes to next operator for drilling 7 holes. Final operation on two presses drills and taps ear and blade holes. **Production:** 38 per hour—triple former method.

ENGINEERING ingenuity really pays off when you adapt Atlas tools for small parts production. It is one sure way to lower man-hour costs despite higher hourly rates.

Savings come from lower equipment cost and eliminating the waste of using unnecessarily large machines for small parts operations—plus savings in set-up time, power, and floor space. Production increases come from devising special mountings in your plant for multiple operations, "jigged" work, semi-automatic air or electrical controls.

Atlas tools are precision made for close tolerance work, with a wide margin of strength and power for all operations within their capacity. Ask your Atlas distributor for full details or send for latest catalog with complete specifications.

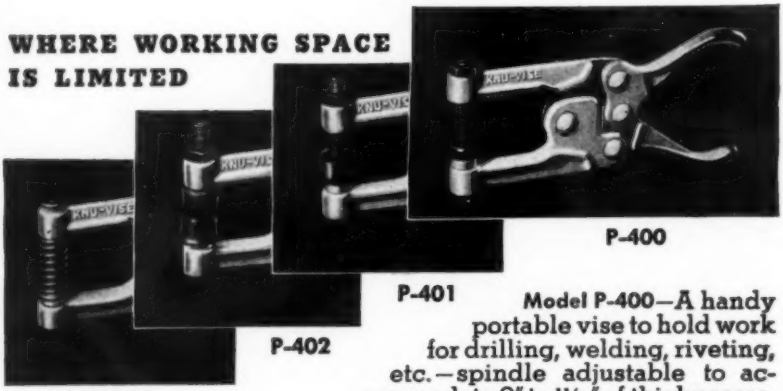
ATLAS PRESS COMPANY

350 N. Pitcher St., Kalamazoo 13D, Mich.

THE PLIERS

FOR QUICK CLAMPING AND RELEASING

WHERE WORKING SPACE IS LIMITED



P-400

P-401

P-402

P-400-FG

Model P-400—A handy portable vise to hold work for drilling, welding, riveting, etc.—spindle adjustable to accommodate 0" to 1 1/16" of thicknesses.

Model P-401—Rubber cap on spindle serves as protection when two different materials must be held together. Curved handles make for comfortable operation.

Model P-402—Has two rubber caps—especially desirable where both surfaces of material held require protection, such as fine woods, etc.

Model P-400-FG—Requires no presetting—spindle automatically adjusts itself to varying thicknesses of materials held—from 0" to 3/8".

Toggle action enables operator to apply and release pliers with simple, effortless motion. Screw driver slot in spindle is used to preset required pressure. Normal hand pressure attains 400 pounds.

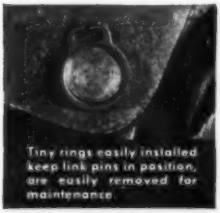
Pliers are made of forged steel, cadmium plated—also available in larger sizes.

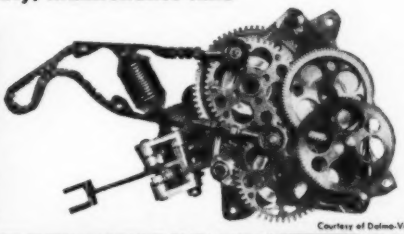
KNU-VISE
INCORPORATED

2207 Eighth St., Detroit 16, Michigan
422 Magnolia Ave., Glendale 4, California

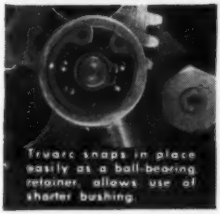
36 TRUARC rings reduce weight, eliminate parts in complex radar aircraft antenna!

● Waldes Truarc Retaining Rings cut machining, assembly, maintenance time



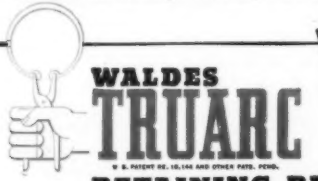


Courtesy of Dalmo-Victor



"TRUARC NOT ONLY REDUCES WEIGHT IN OUR APS-4 AIRCRAFT ANTENNA," states Dalmo-Victor, of San Carlos, California, "but also saves numerous machining, drilling and threading operations and reduces assembly and maintenance time. Waldes Truarc Retaining Rings are easy to install and remove, give equal pressure over a continuous surface because of their perfect circularity, and eliminate large numbers of tools hitherto required. They do not deteriorate under the most rigorous operating conditions."

Wherever permanent maintenance of tolerance is important, Truarc rings keep moving parts in accurate relationship. In all industries, designers find Truarc a better way of fastening machine parts; production and maintenance men find Truarc cuts costs. Send us your drawings; Waldes Truarc engineers will be glad to show how Truarc can help you.



WALDES KOHINOOR, INC., Long Island City 1, New York

● *Send for New Truarc booklet, "New Development In Retaining Rings"*

Waldes Kohinoor, Inc., 47-10 Austel Place 22-L
Long Island City 1, N. Y.

Please send booklet, "New Development In Retaining Rings" to:

Name_____

Title_____

Company_____

Business Address_____

City_____ Zone____ State_____

10,000 Reversibles a month

CAN'T be wrong!

ORIGINATED BY SIZE CONTROL CO.

That's the number of Size Control Reversible Gages produced last month to meet the growing demand for this leader in the gage field.

It's proof that up-to-the-minute Buyers and Chief Inspectors realize that Size Control Reversibles add up to precision and economy . . . that Reversibles lead the field in dollar value for dollar spent. Size Control is as proud as a newspaper is of its circulation with this new peace time high in production of reversible plug gages.

EXTRA VALUES

1. Reversible—for 2-times service life.
2. Extra Long—for 6-times service life.
3. Truncated thread set plugs.
4. Root relief on all thread rings' major diameter at no extra cost.
5. Chrome Salvage.

Send for Catalog 47 for complete information

FAST CENTERLESS LAPPING FOR MICRO SUPER FINISHES

Size Control's new Centerless Lapping Machine gives a precision finish of less than 2 micro inches to cylindrical parts. Requires no special operating skill—piece is simply placed between lapping rolls. No costly set-ups or special tools—handles diameters from .010" to 10.00" with speedy adjustment of roller spacing. Send for Catalog 47.

SIZE CONTROL COMPANY

MAKERS OF PLAIN, THREADED, AND TWIN PLUG GAGES . . . THREAD RINGS, SNAPS
THREAD, GEAR, AND SPLINE WIRES . . . PIN AND DRILL GAGE SETS, FRACTIONAL SETS

2510 W. Washington Blvd., Chicago 12, Ill. Phone: Monroe 6710

DIVISION OF
AMERICAN GAGE & MACHINE COMPANY

SIZE CONTROL CO. — Precision Gages
WALSH PRESS AND DIE CO. — Punch Presses
WACKER SALES, *Affiliate* — Precision Inspection Equipment

Engineering Representatives in Principal Cities

SHARP CUTTERS

Boost Production

The "ACE" Tool and Cutter Grinder has proven its worth in toolrooms around the world
—GETS MORE PRODUCTION
—Cutters stay sharper longer ... less down time for changes
.. MORE ECONOMICAL—
The average life of a cutter is longer ... fewer replacements.
MORE ACCURATE — Cutters sharpened on the "ACE" have all teeth uniformly ground and all teeth cutting.

Use The "ACE" to keep reamers, end mills, side mills, spot facers and all kinds of special tools and cutters in like new condition. (2 models)

OLIVER OF ADRIAN PRODUCTS

IMPROVE YOUR TOOLROOM
IT'S THE BACKBONE OF PRODUCTION

OLIVER INSTRUMENT CO.

1408 E. MAUMEE ST. ADRIAN, MICH.

Send For New Illustrated Catalogue

OLIVER OF ADRIAN

AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS—DRILL POINT THINNERS—TEMPLATE TOOL GRINDERS—FACE MILL GRINDERS—DIEMAKING MACHINES

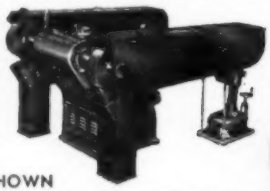
Hammond
OF KALAMAZOO
GOOD MACHINERY SINCE '82

FINISHING PRODUCTION REACHES A NEW PEAK

Hammond
of KALAMAZOO

BACKSTANDS

For converting standard Polishing Lathes into high production abrasive belt grinder polisher units. Lifetime machine tool construction.



HAMMOND "VRO" Variable Speed (1500 to 3000 RPM) Polishing and Buffing Lathe with two No. 3 Backstands.

MODEL No. 3 SHOWN

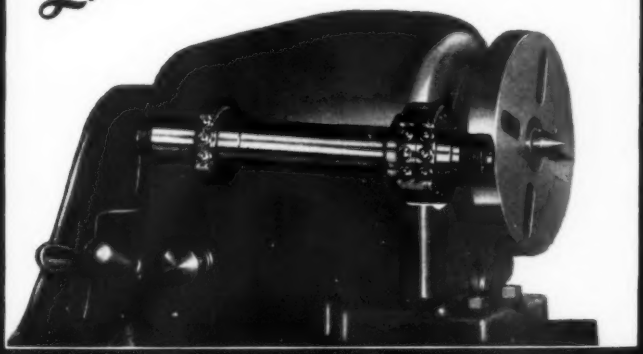
Write for new catalog No. 55 covering Backstands, Polishing Lathes and many types of Finishing Machines including Automatics.

In Operation at Booths 235 & 229, WESTERN METAL CONGRESS, OAKLAND, CALIF., MARCH 22-27

Hammond Machinery Builders INC

1614 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

Logan A NAME TO REMEMBER WHEN YOU THINK OF BETTER LATHES



BALL BEARING SPINDLE MOUNTING

PERMITS HIGHER CUTTING SPEEDS . . .
REQUIRES NO BEARING ADJUSTMENT . . .
SUSTAINS ACCURACY OF LOGAN LATHES

Quick Change Gear Cabinet Turret Lathe

SPECIFICATIONS COMMON TO ALL LOGAN LATHES . . . swing over bed, 10½" . . . bed length, 43⅛" . . . size of hole through spindle, 25/32" . . . spindle nose diameter and threads per inch, 1½"—8 . . . 12 spindle speeds, 30 to 1450 rpm . . . motor, ½ hp, 1750 rpm . . . ball bearing spindle mounting . . . drum type reversing motor switch and cord . . . precision ground ways, 2 V-ways, and 2 flat ways.

With its spindle turning on a pre-loaded ball bearing mounting of extreme precision, the Logan Lathe is inherently well adapted to accurate work at higher spindle speeds. This fact permits the use of high speed carbide cutting tools to full advantage. It assures a minimum of spindle deflection. And since no bearing adjustment is required within the full range of its speeds, 30 to 1450 rpm, the accurate factory alignment of the Logan Spindle remains undisturbed, and original accuracy is sustained. Grease sealed, the Logan Spindle Mounting never needs lubrication. All these characteristics are important factors in the proved ability of Logan Lathes to speed output and cut costs on production lines, and to do fast, accurate work in the tool room. See your Logan Lathe dealer, or write direct for the Logan Lathe catalog. M-2

LOGAN ENGINEERING CO. CHICAGO 30, ILLINOIS

A Purchasing Agent Writes a Norton Advertisement on 32 ALUNDUM*

NORTON ABRASIVES

*T. M. Reg. U. S. Pat. Off.

Norton Company
Worcester 6
Massachusetts

Gentlemen:

We have recently run some tests with Norton's new 32 ALUNDUM Grinding Wheels and the results obtained were so far ahead of anything we have ever used that it is recommended that the Norton Company send one of their representatives here to make a survey and suggest the proper 32 ALUNDUM Wheel specifications for our surface, tool, and internal grinding operations.

In our judgment these new grinding wheels cut faster, require fewer dressings, and last longer than the wheels we are now using for the majority of our grinding operations.

Therefore, we suggest the above recommended survey and change to this new wheel wherever advisable as soon as possible, keeping in mind the depletion of our present stock so as not to have a quantity of old wheels on hand after the change over.

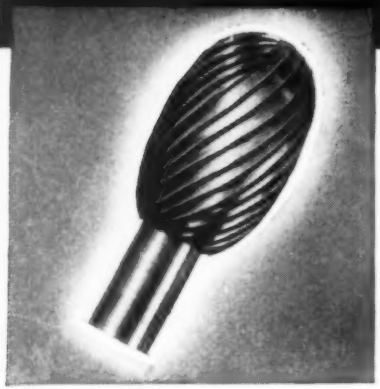
Very truly yours,

(A Prominent Textile Machinery Manufacturer)

Purchasing Agent

DANLY KOOL-KOTE ROTARY FILES

A new addition to our famous Die Makers' Accessory Line . . .



Rotary files that cut hardened die steel at speeds heretofore possible only with mounted grinding wheels have been added to Danly's accessory line. These Kool-Koted files cut hours from the laborious work of finishing dies and last up to 500% longer. Sets of tools containing every shape needed for all-around shop work are available. Write for folders giving complete information and prices.

DANLY PRECISION DOWEL PINS are accurate through their entire length . . . Diamond tested for hardness (58-60 Rockwell-C) . . . Ground to a tolerance of .0001".

DANLY DIE SPRINGS are noted for staying power and high resistance to fatigue. Two complete lines: MEDIUM PRESSURE—HIGH DEFLECTION; HIGH PRESSURE—MEDIUM DEFLECTION.

DANLY SOCKET-HEAD STRIPPER BOLTS . . Made of hi-grade steel, these stripper bolts have the same knurled socket-head found in Danly Cap Screws.

DANLY KNURLED SOCKET-HEAD CAP SCREWS save time and money. The mechanic can drive the knurled head a good part of the way before using the wrench. Infinite applications—a wide range of sizes.

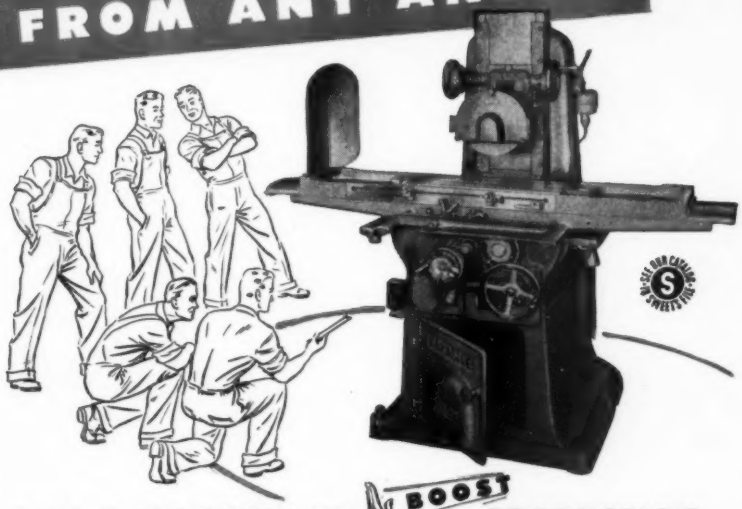
DANLY KWIK-KLAMP TOGGLE CLAMPS combine strong construction and simplicity of operation—used wherever quick, positive clamping action is required.

Branches and Dealers in Principal Cities

DANLY MACHINE SPECIALTIES, INC. 2100 So. 52nd Ave., Chicago 50, Ill.

Danly Tool, Die and Gage Makers' Supplies

FROM ANY ANGLE



IT'S A MACHINE TO BOOST PRODUCTION

ABRASIVE 3B Surface Grinder

SPEED • ACCURACY • LONG LIFE — ABRASIVE 3B *has them all!*

Fast automatic feeds, with standard table speeds of 20 and 40 feet per minute, help maintain heavy production schedules.

Vertical feed dial is graduated to .0001", for precision work of the highest quality.

Cartridge type spindle of alloy steel, 1⅛" diameter, is carried in adjustable bronze box at front and super-precision ball bearings at rear.

Massive one-piece bed casting — weighing 1540 lbs. — insures perfect alignment and minimizes vibration.

Ask for descriptive bulletin.

SPECIFICATIONS:

Work Capacity: 24" long, 8" wide, 12" high

Wheel Size: Standard 10" wheel. 8" or 12" wheels on order

Drive: 3 H.P. motor in base

Table Size Overall: 59" x 10½"

Net Weight: 2670 lbs.

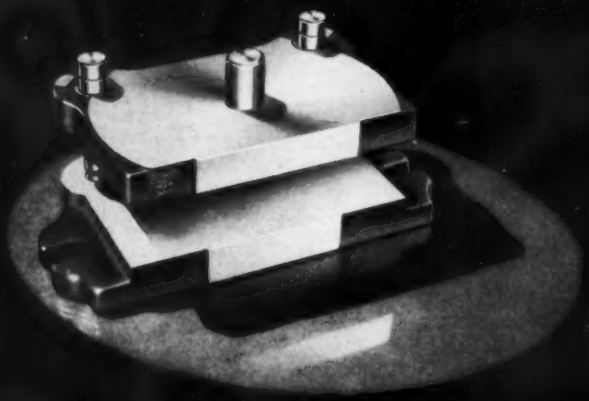
• • •

If you will send us serial numbers of Abrasive machines on the Government Surplus Tool list we will endeavor to supply you with information, attachments or repair parts.

ABRASIVE
ACCURACY BOOSTS PRODUCTION

ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE 14, RHODE ISLAND
Dealers in Principal Cities

Die Sets for Every Stamping Job



Our constant endeavor to deliver a better product is the basis of our ever-increasing volume of business. We invite your inquiries regarding all-steel and semi-steel, standard and special die sets; dowel pins, cap screws, die springs and other accessories.

CALL "DETROIT"

DETROIT	TR 2-5150
INDIANAPOLIS	HU 5604
MINNEAPOLIS	AT 5264
DAYTON	HE 3048
TOLEDO	GA 5706
SEATTLE	SE 2090
PORTLAND, ORE.	AT 1486
SAN FRANCISCO	EX 7018
BUFFALO	PA 9806
PHILADELPHIA	VI 4-4084
ROCK ISLAND, ILL.	RI 743
LOS ANGELES	AD 7951
MILWAUKEE	ED 8359

DETROIT DIE SET CORPORATION

2895 W. GRAND BLVD. • DETROIT 2, MICHIGAN

DETROIT DIE SETS ★

GEMCO multi-purpose SHAPERS

have the FEATURES that are important to YOU

they're **PRECISION** *built for* **PRECISION** *work*

Engineering skill embodied in the design of GEMCO Multi-Purpose Shapers assures their meeting the severity of service to which they are subjected, and insures high precision finish on the work-piece at hand...with ease, speed, and safety, lowering production costs and increasing profits. In three models, Plain, Production and Universal, and in sizes from 16-in. to 36-in. stroke... GEMCO Shapers assure rugged, rigid adaptability to any type job and in any size shop.

Over 30 years of "know how" gained from designing, experimentation, and testing, both in the shop and out on the job, go into the manufacture of GEMCO Shapers. They set a high standard of performance...and are the SHAPERS on which to standardize for quality work.

CONTROLS All dials, levers, push buttons, handles centralized for greatest possible convenience to the operator. Speed production.

COLUMN Advanced design...ith exceptional weight, assuring maximum stability for heavy cuts, high speed operation.

RAM Of high-tensile semi-steel, is deep, massive, and internally ribbed to resist distortion under load.

ROCKER ARM Strongly ribbed and braced, made of high-tensile semi-steel; carries extra large hardened and ground alloy steel crank block in its highly finished sliding surface.

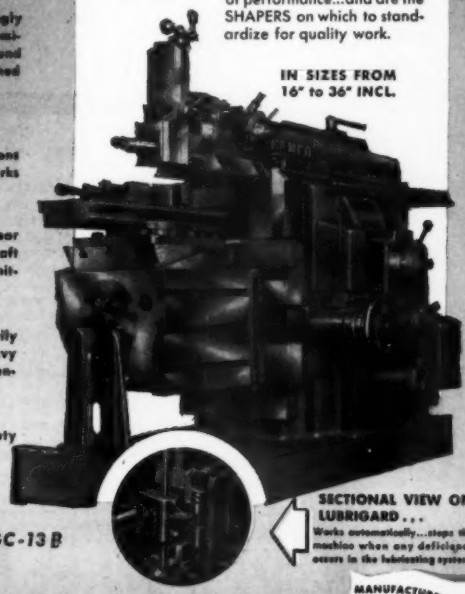
BULL GEAR DRIVE Twin type, for long life; in such combinations that gear noise is minimized and chatter marks are obviated on work-piece.

TRANSMISSION Entire gear drive located within the column; main shaft carries disc clutch and friction brake, permitting instant starting and stopping of Ram.

BASE Single-piece casting, heavily reinforced giving excellent rigidity for heavy roughing cuts or precision finishing over entire range of feeds and speeds.

LUBRIGARD Exclusive safety feature found only in GEMCO Shapers, preventing damage to machine through any failure in the lubricating system.

IN SIZES FROM 16" to 36" INCL.



SECTIONAL VIEW OF LUBRIGARD... Works automatically...stops the machine when any deficiency occurs in the lubricating system.

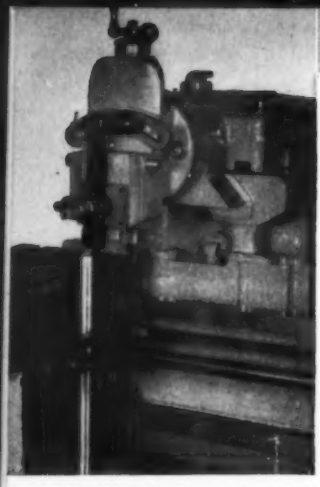
RITE TODAY FOR BULLETIN GC-13B

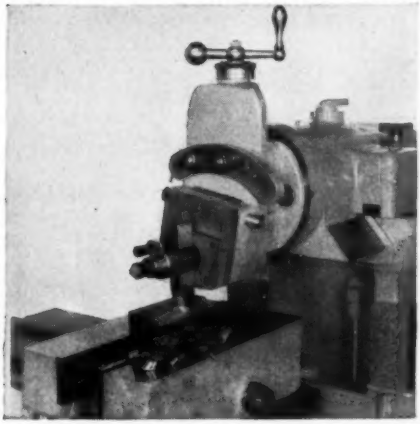
GENERAL ENGINEERING & MFG. CO.

☆ ST. LOUIS 16, MISSOURI ☆

MANUFACTURERS OF PRECISION MACHINERY SINCE 1917

Watch a Champion





SHORT STROKE . . . slotting keyway in end of shaft. Extremely short cutting and return strokes may be set at high speeds . . . without causing vibration or affecting smoothness of cut. Adjustment for any speed or stroke length is made quickly and easily by a simple setting of stroke adjustment levers . . . an important advantage in small lot production.

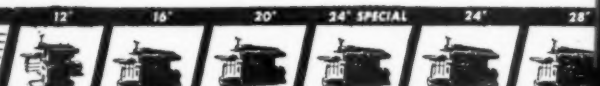
ROUGHING CUT . . . note size of chips. Rugged construction and abundant power make heavy-duty work an "everyday job" for a Rockford Hy-Draulic Shaper. Hy-Draulic design is also a safeguard against excessive feed and resultant overloading. The hydraulic system provides a predetermined maximum pressure, ample for every type of job; when an unsafe overload is met, ram will stop, as oil by-passes.

can you compete . . . ?

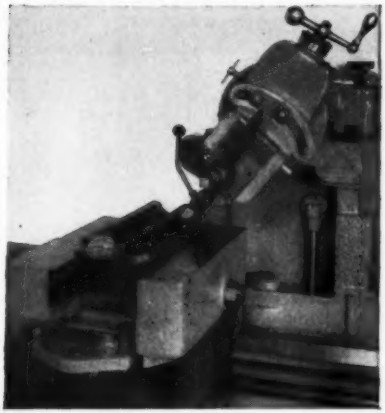
Why not make sure of your shaper equipment now. Ask yourself, could you compete with the work turned out on a new Rockford Hy-Draulic. Compare the work turned out on your present equipment with that of a champion in terms of cost, accuracy, operating ease or speed. Rockford Hy-Draulic Shapers give you accurate, infinite control of stroke and feed. They also give operating advantages that only Hy-Draulic design can provide. Put a Rockford Hy-Draulic Shaper through its paces and watch it perform on every type of shaper job. Write for Shaper Bulletin 442.

ROCKFORD MACHINE TOOL CO.
ROCKFORD ILLINOIS

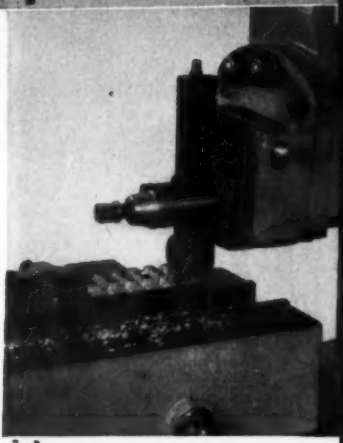
Hy-Draulic



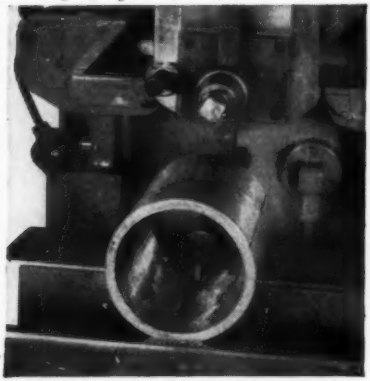
. . go through her paces



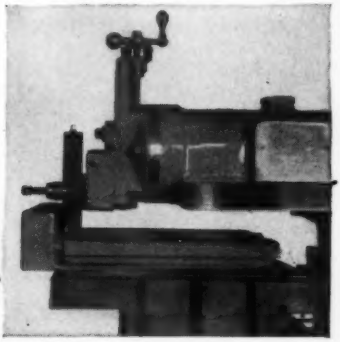
ANGLE CUT . . . cutting a dovetail on a slide. Precision of Rockford Hy-Draulic Shaper construction assures work accuracy and fine surface finish.



INTERMITTENT CUTTING . . . cushioning effect of hydraulic system makes interrupted cutting an easy operation for both tool and machine. Eliminates shock as tool enters each cut . . . protects tool against rapid wear and breakage.



CUTTING TO A LINE . . . cutting keyway up to a drilled hole. As in the preceding illustration, this work set-up is an example of the accuracy in stroke length maintained by the new Rockford Hy-Draulic Shapers.



CUTTING TO A SHOULDER . . . this illustrates ability of shaper to maintain stroke length exactly. Whatever the stroke length or speed, it can be demonstrated that the new Rockford Hy-Draulic Shapers will cut-to-a-line with an accuracy far greater than required by any conventional shaper set-up.

FOR DRY OR COOLANT GRINDING

*SPEED-WET** BOOSTS PRODUCTION with "RESIN-BONDING"

Resin-bond production is premium production—improved speed, stamina and finish at lower cost. Why? Because each individual abrasive grain in Speed-wet resin-bonded products is twice anchored in a heat-set resin adhesive, which, once hardened, can never remelt or flow or release its grip.

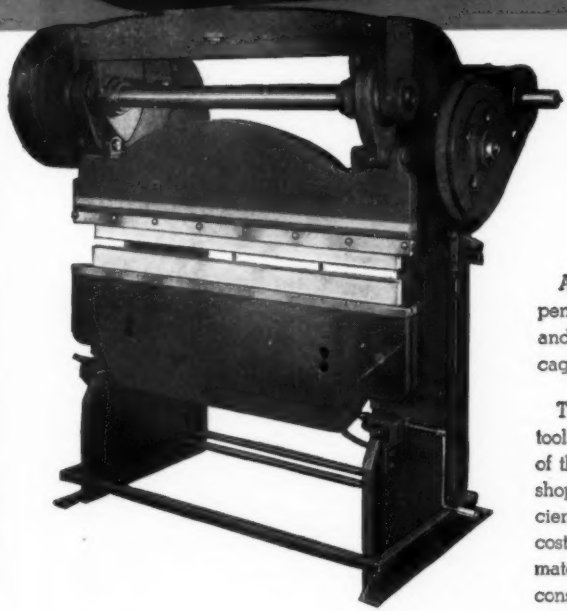
When used dry, Speed-wet resin-bonded abrasives are immune to cutting heats and humidity. Used wet, they are impervious to water, cutting oils or coolants.

Thus, for dry or coolant grinding, or for polishing and finishing of metals or glass or plastics, Speed-wet resin-bond abrasives deliver extra performance. Specify Speed-wet Metalite for aluminum oxide grit—or Speed-wet Durite for silicon carbide. Metalite or Durite, they're both resin-bonded if they are marked Speed-wet*.

*Reg. U. S. Patent Off.

BEHR-MANNING (DIVISION OF NORTON COMPANY) **TROY, N. Y.**

Powerful CHICAGO STEEL PRESS BRAKE



TYPE "300"

A POWERFUL, rugged, inexpensive Press Brake, designed and built to the standards of Chicago Steel Forming Presses.

This money-saving production tool will handle 40 to 50 percent of the work done in an average shop. Greater speed, higher efficiency—much lower operating cost—plus the highest quality material and sturdy steel welded construction as in our larger machines.

—3 sizes—capacities 10 gage, 4 ft. long; 12 gage, 5 ft. long; 14 gage, 6 ft. long. Powered by 1½ h. p. motor.

We also build special machines for intricate bending operations.

Take advantage of our experience of over 45 years by sending to us any difficult bending problem you have.

WORLD'S LARGEST MANUFACTURER OF HAND BENDING, POWER BENDING AND POWER PRESS BRAKES

DREIS & KRUMP MANUFACTURING CO.

7440 LOOMIS BLVD. • • CHICAGO 36, ILLINOIS

SEND FOR NEW BOOK "FORMING PRESS DIES AND THEIR USES"

Simonds Abrasive Wheels lengthen tool and cutter life

When tools and cutters become dulled and wear out too quickly, it's time to examine your shop practice in relation to grinding wheels and grinding frequency. Are you using the correct abrasive combination? Are you grinding frequently enough? Simonds Abrasive Company offers you the means of selecting the right wheels and determining the best procedure for producing the keen straight edges that mean maximum efficiency, longer service from your tools and cutters. From Simonds Abrasive's complete line you can select Borolon and Electrolon wheels of all shapes and sizes for fast, cool cutting on hardened and high speed steels, high carbon, high chrome and other alloys. With the Simonds Abrasive Data Book you have a valuable guide to proper wheel selection. Send for your copy today. Simonds Abrasive Distributors, in all principal cities, are ready to serve you.

SIMONDS ABRASIVE COMPANY
is a division of
SIMONDS SAW AND STEEL CO.
Fitchburg, Mass.
Saws, Machine Knives, Files

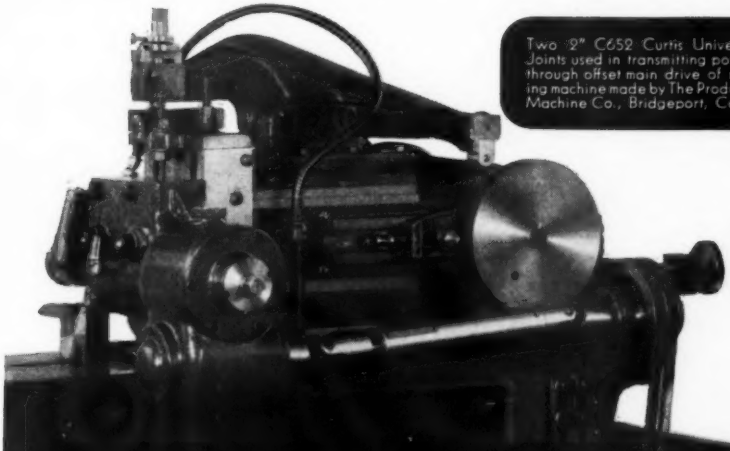
Other Divisions:
SIMONDS STEEL MILLS
Lockport, N.Y.
Special Steels

SIMONDS CANADA SAW CO. LTD.
Montreal, Can.
Simonds Products for Canada

SIMONDS ABRASIVE CO.
PHILADELPHIA, PA.

SIMONDS ABRASIVE COMPANY • TACONY AND FRALEY STREETS • PHILADELPHIA 37, PA.

EFFICIENT... for offset Power-Drives



Two 2" C652 Curtis Universal Joints used in transmitting power through offset main drive of milling machine made by The Producto Machine Co., Bridgeport, Conn.

Years of dependable, trouble-free service have proven to many leading machine tool manufacturers that Curtis Universal Joints are the answer to their offset power-drive problems.

Curtis Joints have fewer parts — no threads to work loose and are precision fitted in assembly to insure a smooth, positive-action joint that gives maximum life with minimum maintenance — factors of real importance in power drives.

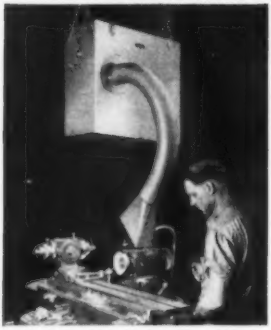
Available in 14 standard sizes from 3/8" to 4", either single or double. Quotations on special sizes, bores or tolerances gladly made, upon request.

Write for Engineering Data and drafting templates.

WRITE DEPT. B-1

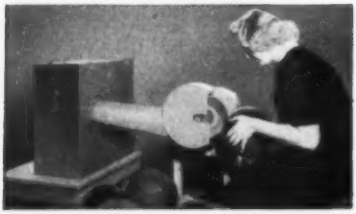
CURTIS UNIVERSAL JOINT CO. INC.
4 BIRNIE AVENUE SPRINGFIELD 7, MASSACHUSETTS

STOP DUSTS



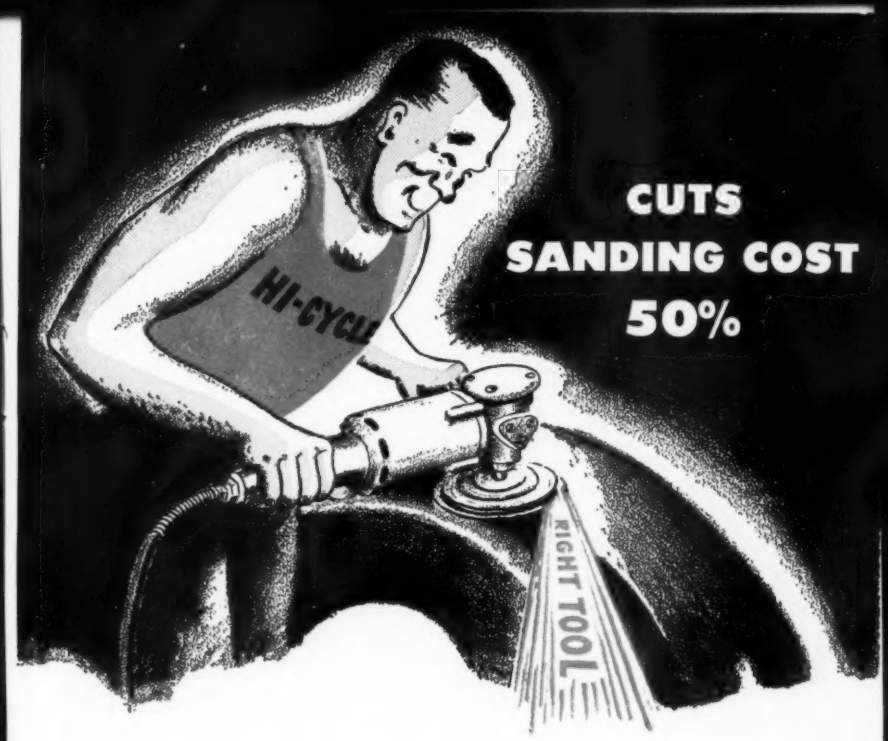
With Low Cost Individual
DUSTKOPS

All types of dusts are stopped by Dustkops: Dusts from Grinders, Polishers, Buffers, Sanders (belt and disc), Abrasive Cut-offs; Woodworking Equipment; Fumes from Degreasers; Vapor from Screw Machines and Thread Grinders all can be stopped with least cost by DUSTKOPS.



Send for 16-page catalog and recommendations for your dust problem.

AGET-DETROIT COMPANY
205 Main at Washington
ANN ARBOR, MICHIGAN



CUTS SANDING COST 50%

THIS sheet metal fabricator formerly used universal electric sanders for smoothing off welds. They weighed 21 lbs. and had a load speed of 2500 R. P. M. Production was lagging. The Rotor Application Engineer saw this as a natural for Rotor High Cycle Sanders. These were installed and the superintendent reports:

Output per man doubled because High Cycle Sanders have sustained load speed of 4600 R.P.M.

Easier handling because High Cycle tools weigh only 16 lbs. . . . less fatigue for operator.

No increase in sanding disc cost despite doubled output.

The Rotor Engineer can probably show *you* similar possibilities to cut costs. Bul. 30, free on request.

Yours for more output per dollar,

HI-CYCLE O'TOOL

THE ROTOR TOOL CO.

CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

Avey Automatic
METHOD No. 1

THE *Avey* CAM FEED UNIT

No. 1 Size—½" capacity in cast iron.
No. 2 Size—⅞" capacity in cast iron.

designed for simple automatic indexing when duplication of operation on any number of faces of work is required

The AVEY Cam Feed Unit (Avey Automatic Method No. 1)—a low capital investment. It decreases the cost per piece in production. This is accomplished by Speeding Production—Less Operator Fatigue—the enabling of semi-skilled operators to deliver High Quality Production: Speedily, Accurately, Efficiently, and with a minimum of supervision.

Send for Engineering Bulletin 645

By Invitation Member

THE AVEY DRILLING MACHINE CO.
CINCINNATI • OHIO • U. S. A.

Emblem of BUSINESS CHARACTER
Rice Leaders of the World Association

NOTICE

TO USERS OF SURFACE GRINDERS

You do better work and more of it per machine per day when your 6" x 18" Surface Grinders are equipped with this

POPE COMPLETELY SEALED
MOTORIZED SPINDLE

Here is a *smooth, streamlined, self-contained package unit* with G-E motor *sealed in* and with *sealed lubrication* for its extra big SKF Super-Precision Double Row roller bearings. Dust and dirt can't get at it. It runs cool, needs no attention, delivers a full 1 HP at the wheel.

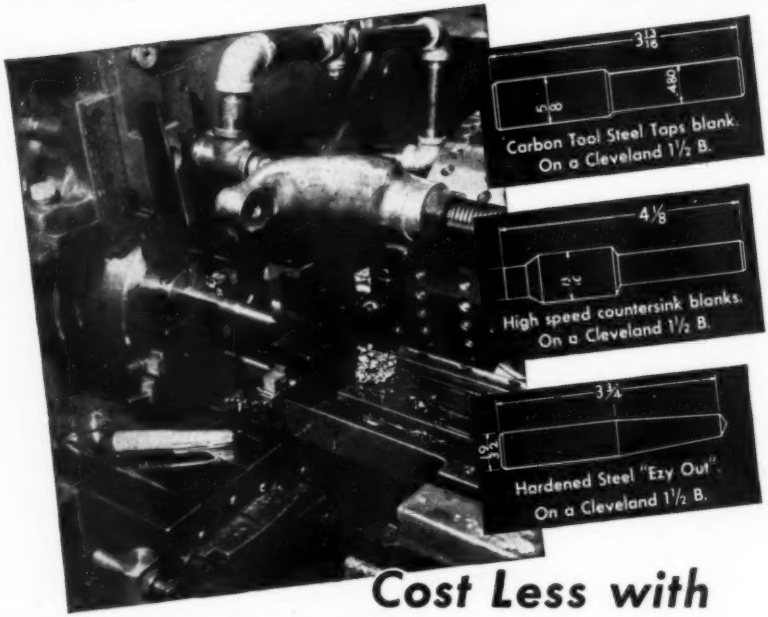
Put this Pope Precision Spindle to work on your grinders and see for yourself how fast it roughs off surplus metal and what superior finishes it produces.

Let us mail you Data Sheet No. 12.

No. 41

POPE POPE MACHINERY CORPORATION
ESTABLISHED 1920
301 RIVER STREET • HAVERHILL, MASSACHUSETTS
BUILDERS OF PRECISION SPINDLES

TOOLS—TAP and DRILL BLANKS



Cost Less with
CLEVELAND *Automatics*

Obvious requirements in blanks for "shank" tools are precision and low cost . . . but definitely. Best answers are not always so obvious. Not all production planners realize the speed and accuracy with which such items can be produced on Cleveland Single Spindle Automatics . . . like the Model B machine pictured above automatically turning an "Easy Out". Very simple form, but it involves taper turning, end pointing. Other blanks, in prints, call for multiple diameters, chamfers, etc., all accomplished with speed at low cost on Cleveland Model B's. Sizes 9/16" to 2½". Check this against YOUR production problem.

THE CLEVELAND AUTOMATIC MACHINE CO.
4934 Beech Street • CINCINNATI 12, OHIO
BRANCHES: Cleveland • Chicago • Detroit • New York • Hartford

GRIPPING FORCE 15 TIMES AIR LINE PRESSURE

Speedy Air Vise helps you do dozens of operations faster, better, cheaper—by air pressure! Foot control valve opens and shuts vise instantly, leaving *both* hands free to produce *more!* Jaw opens up to 3 inches, holds castings, parts, jigs, etc. Compact, trouble-free, inexpensive.
Complete with Foot Control Valve, Air Hose and Fittings . . only **$29.90**

ORDER FROM YOUR MILL SUPPLY DEALER OR WRITE DIRECT

AIR REGULATOR
Precision-built. Delivers pressures up to 140 lbs. With gauge, $4.95. Less gauge, $3.10

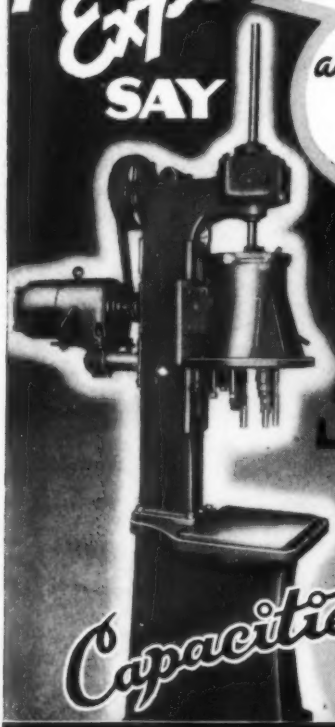
AIR FILTER
Keeps water and particles out of the regulator and pneumatic tools. $1.85

BLOW-GUN
Looks and operates like a gun. Ideal for cleaning and blowing out chips, dust, filings, scraps, etc. . . . $3.00

W. R. BROWN CORP. • 5720 ARMITAGE AVE. • CHICAGO 39, ILL.

Time Study Experts SAY

with LIMA Gearshift Drives OUR METHODS and PRODUCTION are BETTER··FASTER ···SAFER!



Remember...

SELECTIVE SPEEDS with LIMA Gearshift Drives

UPS your PRODUCTION

DOWNS your COSTS

Capacities - SINGLE-PHASE ½ and ¾ hp.

POLYPHASE ½ to 20 hp.

THE LIMA ELECTRIC MOTOR CO.

248 FINDLAY ROAD

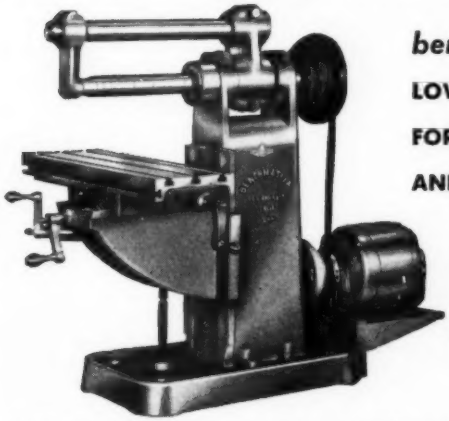
LIMA, OHIO

REPRESENTATION IN MOST PRINCIPAL CITIES

LIMA GEARSHIFT DRIVES

LIMA PEDESTAL GRINDERS - LIMA ELECTRIC MOTORS

ONE for TWO jobs



benchmaster OFFERS A LOW-PRICED BENCH MACHINE FOR *BOTH* HORIZONTAL AND VERTICAL MILLING

benchmaster mill with horizontal spindle overarm

SAVES VALUABLE SPACE—CUTS DOWN EQUIPMENT COSTS

Now you can obtain a precision perfect, high-speed *benchmaster* milling machine that's easily convertible from a horizontal to a vertical miller by simply interchanging spindle attachments. Its *un*usual versatility, plus the *usual* quality-plus *benchmaster* workmanship, make this double-duty milling machine an outstanding addition to your shop.

SPECIFICATIONS: Table size—6"x 14"—Three Tee Slots ⅜", 2" center Longitudinal travel 8½"—Traverse travel 5½"—Vertical travel 8½" on vertical mill—9½" horizontal mill—Height 28"—Weight (less motor) 215 lbs.—Requires ⅓ h.p. motor—Spindle speeds (standard 1725 rpm motor) 450-850-1400-2100 rpm.

For complete information write to Dept. MT-3

benchmaster MANUFACTURING COMPANY
2952 WEST PICO BOULEVARD
LOS ANGELES 6, CALIFORNIA

With Two DI-ACRO BENDERS

A difficult production problem of forming two bends in a long length of tubing was solved by "teaming up" two DI-ACRO Benders as illustrated. This dual-forming arrangement saved installation of special machinery. Two accurately formed bends are obtained in one operation—without distortion of the tube and at a cost competitive to power operated equipment. More than 300 pieces are completed per hour—600 individual bends.

"DIE-LESS DUPLICATING" Often Does it Quicker WITHOUT DIES

This is but one example of how DI-ACRO precision machines —Benders, Brakes and Shears—can accurately and economically duplicate a great variety of parts, pieces and shapes, without die expense. Write for catalog—"DIE-LESS DUPLICATING".

◀DI-ACRO is pronounced "DIE-ACK-RO".

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

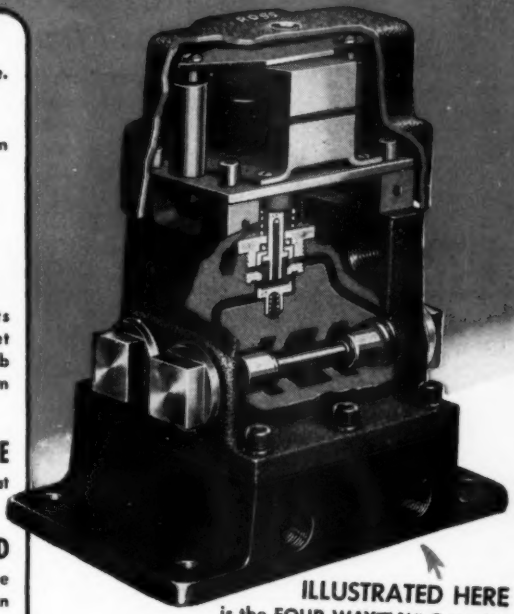
O'NEIL-IRWIN MFG. CO.

314 EIGHTH AVENUE, LAKE CITY, MINNESOTA

The *Air Valve* You Have Been Looking For

PILOT OPERATED · SOLENOID CONTROLLED

★A New ROSS Piston Poppet Type Valve★



ILLUSTRATED HERE
is the FOUR-WAY—⅜" Capacity

- **FAST OPERATING** as high as 400 cycles per minute.
- **LARGE ORIFICE AREA** results in fast exhaust, minimum restriction to air flow.
- **POSITIVE SEAL** by line pressure.
- **SIMPLICITY OF DESIGN** removing end plugs permits replacement of piston poppet assembly — no need to disturb piping or to move valve from position—no "down time".
- **ECONOMICAL TO OPERATE** current consumption 1.2 amps. at 110 volts—60 cycle.
- **LONG SERVICE ASSURED** many Ross valves installed more than 20 years ago are still in active service.
- **SMALL AND COMPACT** appreciated where space is limited.
- **ALL PARTS** non-corrosive metals.
- **ACCURATELY MACHINED** and all parts interchangeable.

Available in:-

- **THREE-WAY** *normally open, or normally closed*
- **FOUR-WAY** *and*
- **FOUR-WAY,** *Five port.* *may be had in ¼", ⅜", ½" and ¾" pipe size*

A TYPE AND SIZE FOR EVERY PURPOSE
★
OVER 100 DIFFERENT MODELS

ROSS Air Control VALVES

ROSS *Operating* VALVE CO.
6480 Epworth Blvd. Detroit 10, Mich.

THE BRIDLE FOR AIR HORSEPOWER

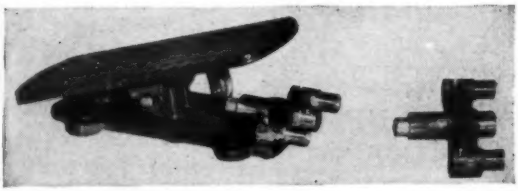
"Air Devices by Redmer"

RC-5

Redmer AIR CHUCK Index Chuck with Air Operated Collet

Eliminates removing chuck from base of machine for changing index position. Index screw posts located on OUTSIDE of chuck. Provides positive alignment and depth control by using stationary type collets. Capacity 1/16" to 2".

Redmer AIR CHUCK Air Foot Control and Valve

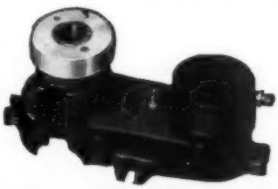


No. FC-28 V-29

Designed to make its operation as tireless as possible. Opening and closing of plunger of valve on foot pedal is operated by a roller on pedal casting which relieves wear on plunger and facilitates operation. Valve is a brass casting which will take plenty of abuse and can be removed from the foot control and used as a separate unit in connection with cam operations.

Redmer AIR CHUCK Collet Air Chuck

An air operated collet holding fixture using same type collets as Brown & Sharpe automatic screw machines. For drilling, milling, threading, etc., also for assembly work. Six models, No. 00, No. 10, No. 0, No. 2, No. 2 Special, No. 4, Collet Capacity 1/16" to 3½".



Write for literature and prices

REDMER AIR DEVICES CORP.
656 W. LAKE STREET, CHICAGO 6, ILL.

Cut Machining Costs

with GORTON Tracer Control

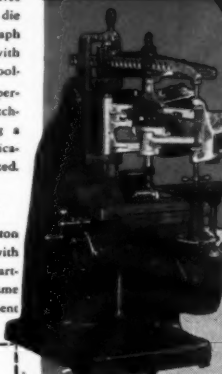
For Precision Machining on Work of Various Sizes

Beautiful plastic chests such as the one shown here are made possible by the painstaking and highly skillful craftsmanship of the engraver who engraves a master model which is then transformed into a die or mold through the use of a Gorton Pantograph with Tracer Control which mills or engraves with true fidelity every mark of the original engraver's tool.

Tracer Controlled Milling is our term for Super-Speed precision milling, engraving, electrical etching or other metal removal operations using a Master pattern. There are many profitable applications for which this method is specifically indicated. It will pay you to investigate now.

Gorton Pre-Determines Results For You

Find out today if you can save money with Gorton Tracer Control. Send us a complete description with prints of one of your jobs. Our Engineering Department will prepare a production estimate on the same job tooled on Gorton Tracer Controlled equipment —no obligation.



Illustrated—distinctively designed cameo Silverware Chest in Ivory Plastic. For further details, write Marshall-White Co., 426 S. Clinton St., Chicago, Illinois.

Gorton 3-L Pantograph on which this job was done

FACTS ABOUT THIS JOB

- OPERATIONS: Mill at 2 to 1 reduction intricate design in center panel and two borders.
- MACHINE: Gorton 3-L 3-dimensional Pantograph.
- PART: Mold for top of Plastic silverware chest; mild steel, 17⅝" x 12⅝₁₆" x 1⅛.
- CUTTERS: Gorton single and multi-flute end mills.
- SPINDLE SPEED: 7400 R.P.M.
- TIME: Total time including setting-up, cutter grinding and milling was 120 hours—a tremendous saving over any other method.

Use this Handy Coupon

PLEASE SEND WITHOUT OBLIGATION
Bulletin No. 1655

Name .....
Company .....
Position .....
Address .....
City ..... Zone ..... State .....

Bulletin 1655 will give you comprehensive information about Gorton Tracer Controlled equipment. Fill in and mail this coupon today!

GORTON

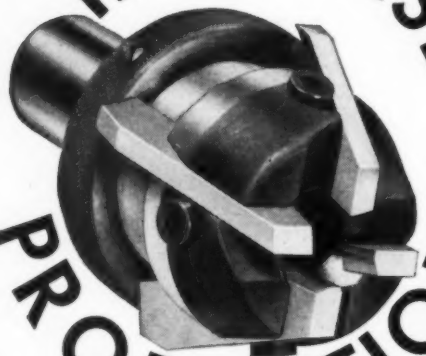
2-A

GEORGE GORTON MACHINE CO.

Tracer Controlled Milling

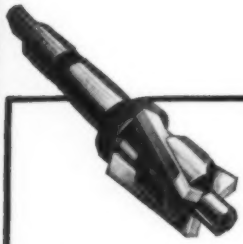
1403 RACINE STREET • RACINE, WISCONSIN, U.S.A.

INCREASE PRODUCTION



GENESEE
GENESEE
GENESEE
GENESEE
GENESEE
GENESEE
GENESEE
GENESEE
GENESEE
GENESEE
GENESEE

ADJUSTABLE HOLLOW MILLS



There is a Genesee for every hollow milling job. Available in 16 styles. Standard sizes from 0 to 2", with straight or Morse taper shanks carried in stock . . .

- Each size tool has 1/8 range.
- Blades quickly ground in a simple fixture.
- All tools manufactured of heat-treated alloy steel.
- Adjusting threads are ground from the solid and adjusting rings are lapped for extreme accuracy.
- Furnished with high speed steel, cast-alloy, or Tungsten Carbide tipped blades.

Let our Engineering Department solve your Production Tool problems.

Other Genesee tools that will increase production.

•

Inserted Blade
FACING AND
COUNTERBORING
TOOLS

•

SPECIAL PRODUCTION
TOOLS

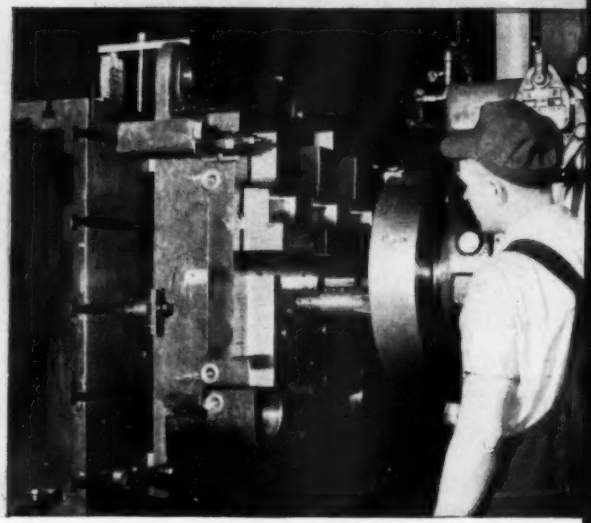
Write for catalog 45H.

GENESEE MFG. CO., INC.
GENESEE
EST 1008
ROCHESTER 4, N.Y.

ADJUSTABLE HOLLOW MILLS • FACING AND COUNTERBORING TOOLS • SPECIAL PRODUCTION TOOLS

Now Danly Special Die Sets

with any additional machining required



New equipment installed in the Danly shop permits us to do any machine work on large or complex die sets incidental to the mounting of the dies. Inserts, recesses, additional boring, keyways and other machining can be done to the customer's specifications.

Time is saved by this service as work on dies and on the die set can be done at the same time. It permits the die shop or tool room to devote their equipment and man hours to the making of dies. The problem of the handling of big sets, for which the die shop or tool room are not generally equipped to do economically, is also solved by this service.

These special die sets are then delivered ready for the mounting of the dies. Note the size and complexity of the die set shown on this page. This die set—machined at Danly—is an example of the additional machining and service which this company offers.

On your next special die set inquiry include the additional machining work that you wish done at Danly while the die set is being made. The cost of this machining will be shown as a separate item in the quotation.

DANLY MACHINE SPECIALTIES, INC.

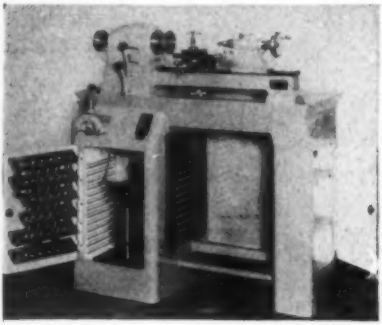
2100 South 52nd Avenue • Chicago 50, Illinois

Branches in Principal Cities

DANLY *Special* DIE SETS

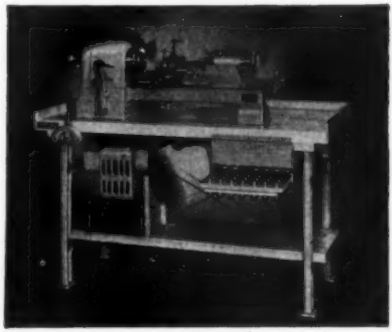
MACHINED TO YOUR SPECIFICATIONS

ON SMALL DIAMETER PRECISION WORK . . . Assure Ultra



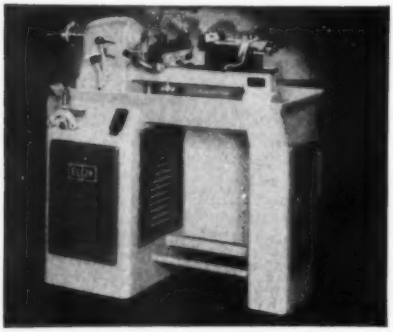
Elgin Knee Hole Type Bench Lathe

Has Variable Speed Drive with range from 120 to 3800 RPM. 9" swing, 17" between centers, 1" collet. Generous leg room for operator. Door of motor cabinet fitted with collet rack. Three roomy storage shelves.



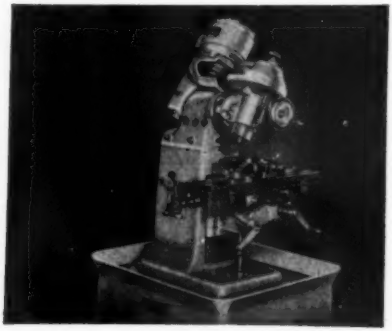
Elgin Bench Lathe

Laminated hard maple top, enclosed motor, safety guard for belt, handy collet drawer. Variable Speed Drive for any spindle speed from 120 to 3800 RPM. 9" swing, 17" between centers, 1" collet.



Elgin Knee Hole Type Hand Screw Machine

Variable Speed range, 120 to 3800 RPM. 9" swing. 1" collet capacity. Collet rack inside of motor compartment door. Independent coolant system (5 gal.) mounted in rear, outside—cleaner, more accessible.



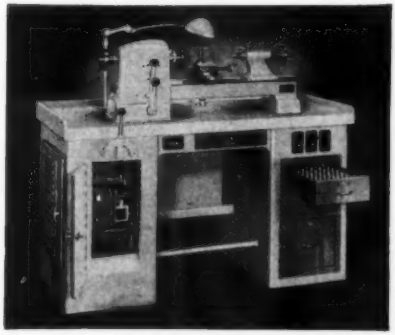
Elgin Vertical Bench Milling Machine

Preloaded ball bearing spindle. 9/16" collet capacity. Five speeds ranging from 400 to 4000 RPM. Vertical travel of spindle, 1¾". Table 4½"x18". 90° swivel each side of center line.

★ ELGIN TOOL WORKS

Efficiency WITH ELGIN

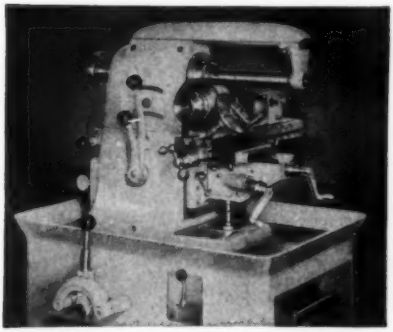
BENCH TOOLS



Elgin Desk Type Bench Lathe

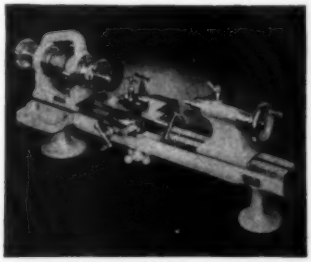
Variable Speed Drive, 40 to 4000 RPM. Low speed rate for grinding operations. Free turning spindle for truing-up and setting work by hand. Ample drawer space. 9" swing, 17" between centers, 1" collet.

The entire line of ELGIN High Speed Precision Bench Tools is designed to pay you dividends in better machining results, faster production, greater versatility, maximum operator convenience. The machines shown here assure "complete coverage" of your needs for both toolroom and production work. Note the trim, clean-cut lines . . . the provisions for operator comfort . . . the ample storage space for tools and accessories. And remember—the Elgin Bench Tools shown in the large illustrations (with exception of Vertical Miller) are equipped with the VARIABLE SPEED DRIVE which permits instant changes of spindle speeds over a wide range of RPM without stopping spindle and shifting belt. Operator is encouraged to use proper speed for each operation, changing as often as necessary . . . which means closer precision, better finishes. Write for specifications, prices, delivery dates!

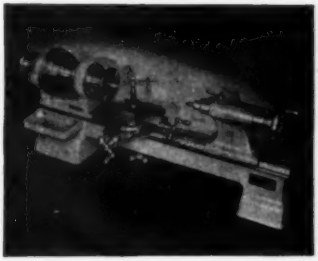


Elgin Horizontal Bench Milling Machine

Variable Speed Drive, 85 to 2750 RPM. Collet capacity, 1". Table 4½" x 18". Longitudinal travel, 12". Transverse travel, 6". Vertical travel, 6".



Two Lathes at Right
(reading top to bottom)



(Upper) Model CB-5C Precision Bench Lathe

Open Cone Headstock. 1" collet capacity, 9" swing, 17" between centers, 36" bed. Speeds up to 4000 RPM. Flat belt only.

(Lower) Model 4EV Precision Bench Lathe

Open Cone V-belt Headstock. For either V or flat belt. 7/16" collet capacity, 7" swing, 17" between centers, 32" bed. Speeds to 10,000 RPM.

1772 BERTEAU AVE.
CHICAGO 13, ILL.

NO BINDING!

HOLLOW GROUND SAW
Sizes from 1¼" x 1/32" to 10" x 3/10"

NO DRAGGING!

with

CIRCLE (R)

METAL SLITTING SAWS

SIDE CHIP SAW
Sizes from 2½" x 1/16" to 8" x 3/10"

Here are two types of slitting saws for regular and heavy feed duty. The Circle R side chip slitting saw in particular is designed to take deep cuts, split chips and eliminate dragging. With all Circle R saws, in all sizes, there is no binding, no dragging.

For complete details and specifications on these and other Circular Saws, send for our Catalog L.

CIRCULAR TOOL CO., INC.

PROVIDENCE 5, RHODE ISLAND

CHICAGO • PHILADELPHIA • NEW YORK • DAYTON • CLEVELAND • ROCHESTER
LOS ANGELES • INDIANAPOLIS • DETROIT • ST. LOUIS

SIMONDS

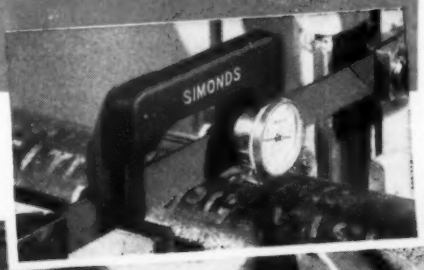
Provides these

2 Extra Aids

to make sure all users get Smoother Cutting and Longer Life from all

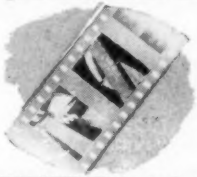
"RED END"

Hacksaw Blades



1. New Educational Motion Picture. Designed to take a new operator through the various steps in the proper use of both hand and power-machine hacksaw blades. It helps him select the right blade for different cutting jobs and the correct methods of operation in order to get greatest efficiency and longest blade life.

This 16 mm. film, with color and sound, will be interesting and helpful to experienced operators also, because it actually shows how hacksaws cut. And it explains the new technique of hacksaw tensioning which has helped many plants to get greater cutting efficiency. Showings may be arranged through the nearest Simonds office.



2. "SIMOMETER" Eliminates Guesswork in Hacksaw Tensioning. This new device saves costs by eliminating guesswork when tensioning blades. Attached directly to any blade, the "SIMOMETER" avoids inaccuracies due to friction of blade holder, or to varying thread pitches of tightening devices. Ask your Industrial Supply Distributor for a demonstration.

SIMONDS
SAW AND STEEL CO.

FITCHBURG, MASS.

Other Divisions of SIMONDS SAW AND STEEL CO. making Quality Products for Industry

SIMONDS STEEL MILLS	SIMONDS ABRASIVE CO.	SIMONDS CANADA SAW LTD.
Special Electric Furnace Steels	Grinding Wheels and Grains	Simonds Products for Canada

BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass., 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif., 228 First St., San Francisco 5, Calif., 511 S. W. First Avenue, Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Wash. *Canadian Factory:* 595 St. Remi St., Montreal 30, Que.

FOR SPEED STRENGTH ECONOMY

FASTEN THAT NEW PRODUCT

WITH *Chicago*

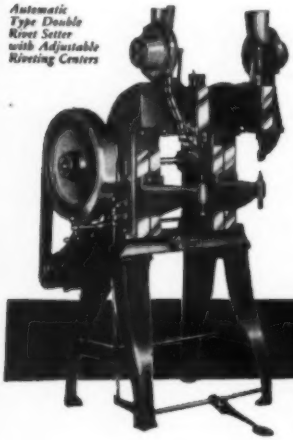
AUTOMATIC RIVETING

Success or failure of your new product in post-war competition may depend on your speed and cost of production. If a fastening operation is involved, Chicago Automatic Riveting will fasten it faster . . assure strongly fastened assemblies at low unit cost. From one to four tubular rivets or split rivets are fed, inserted and clinched in the split second it takes to release a Chicago foot pedal. Several models of Chicago Riveters are adjusted in just a few minutes to handle different sizes of rivets.

Automatic Type Single Rivet Setter

FASTEN ALL TYPES OF MATERIALS

Chicago Automatic Rivet Setters fasten wood to wood, composition to composition, fabric to fabric, metal to metal, leather to leather, or any combination of these materials. They clinch grommets and eyelets, and insert drive screws as efficiently as they set rivets. Plan now to assure strong fastenings at higher speed and lower costs with Chicago Automatic Riveting. Write today, for catalog information.



Automatic Type Double Rivet Setter with Adjustable Riveting Centers

LET US ANALYZE YOUR FASTENING PROBLEM

You can learn, without cost or obligation, how your fastening output may be speeded up, and costs reduced. Just send a blueprint or a sample assembly and ask for a fastening analysis. Our engineers will gladly analyze your particular problem. Production rates can be set up from the report they give. Make use of this expert service, as you plan new products.

Chicago Rivet

CHICAGO RIVET & MACHINE CO.

9610 W. Jackson Blvd., Bellwood, Ill. (CHICAGO SUBURB)

the practical

TO YOUR MILLING PROBLEMS

THE [illegible] BRIDGEPORT MILLING MACHINE

The Bridgeport Turret Milling Machine with High Speed Attachment handles milling, drilling and boring at all angles, with maximum ease and convenience. It is accurate and speedy, sturdy and powerful—a precision machine for production demands.

Shaping operations can be performed at all angles, making this attachment fast and practical on die and mold work of all kinds, as well as for intricate slotting on production jobs.

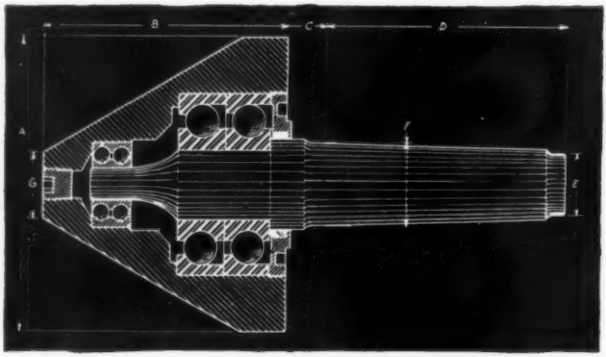
Features include: 15" diameter turret with 5" overarm, rugged construction, table, knee and saddle in convenient front-of-machine position, anti-friction bearings throughout, keyed overarm with worm wheel control for angular settings, large diameter graduated dials.

Bridgeport WRITE FOR BULLETIN

MACHINES INC. BRIDGEPORT, CONN.

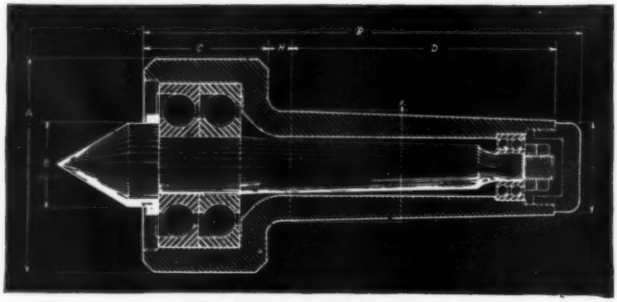
ROOFE LIVE CENTERS

Buy the Best – why try the rest



Bull Nose or Pipe Centers

Roofe Bull Nose Centers are used for any tubular machine work, tool joints, oil field or similar jobs. Bearing capacity 2,000 lbs. to 40,000 lbs. Nose sizes to your specifications.



Roofe Type "M" Centers

Type "M" Centers are used to rough turn, finish turn and to thread without chattering. Used on grinders to a tolerance of .0001". Have been used for turning shafts of 28,000 lbs. and castings weighing 46,000 lbs.

From an engineering standpoint Roofe Centers are basically correct in principle and meet the hearty approval of machinists.

Standard or Special Tapers can be furnished to your specifications.

ROOFE MACHINE WORKS, INC.

5415 Harrisburg Boulevard

W. 31604 **HOUSTON 11, TEXAS**

For HEAVIER FEEDS at HIGHER SPEEDS

Drilling a single hole in a forged brake lever, as shown in the photo, is not a difficult operation. Yet even in this case, *cost per hole* has been the determining factor in selecting the proper drill for the job. On this basis you will find that CLE-FORGE High Speed Drills give you maximum results at minimum cost. Because these drills consistently take heavier feeds at higher speeds, they produce holes at lower cost.

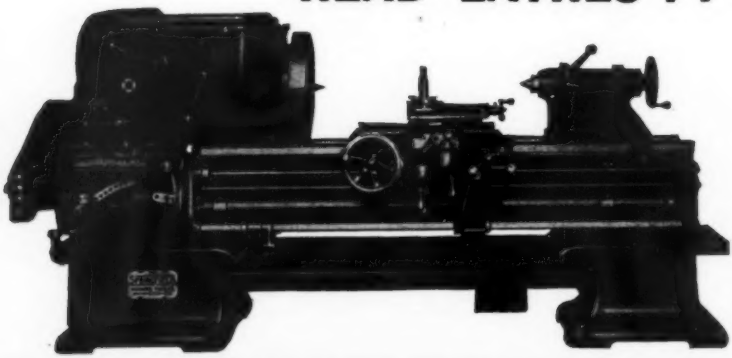
Telephone your INDUSTRIAL SUPPLY DISTRIBUTOR

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49TH STREET
CLEVELAND 14

"CLEVELAND" DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU

Springfield

HEAVY DUTY GEAR HEAD LATHES . . .



TOOL ROOM LATHES are equipped with Lead Screw Reversing Mechanism, producing right and left hand threads and feeds controlled by lever at right hand side of Apron with automatic stops for both Lead Screw and Feed Rod. Oil Pan is also included as regular equipment.

Extreme accuracy and long life are maintained in SPRINGFIELD LATHES by the deep, well ribbed bed made from High Test Nickel Chrome Gray Iron. These beds are made in our own Foundry and, after exhaustive metallurgical and wear tests by professional laboratories, and practical tests in the field, this material has proven itself to be the best for use in lathe beds. It gives greater wear resistance, freedom from scoring, and freedom from internal strains, which factors all result in greater accuracy throughout the life of the lathe.

The direct reading Gear Box is tongued, grooved and bolted to front of bed and is the enclosed type to exclude dirt and chips from gears. Wide gears and heavy shafts are used with Ball and Bronze Bearings throughout. Thirty-six (36) changes of threads and feeds are obtained, and in connection with the Reverse Gears, either right or left hand threads can be produced without the use of wrenches.

SEND TODAY FOR BULLETIN 116

THE SPRINGFIELD MACHINE TOOL CO.

SPRINGFIELD • OHIO, U. S. A.

ACRO DIE SET PULLERS

The principle of the Acro Die Set Puller is to remove the punch holder from die shoe by [illegible] pull, whereby punch holder travels upward from die shoe axially, leaving [illegible] leader pins simultaneously. This can be accomplished only by use of the indexed screw wrenches which act as indicators, controlling the upward travel. This is an exclusive patented by Acro feature, found only on Acro Die Set Pullers.

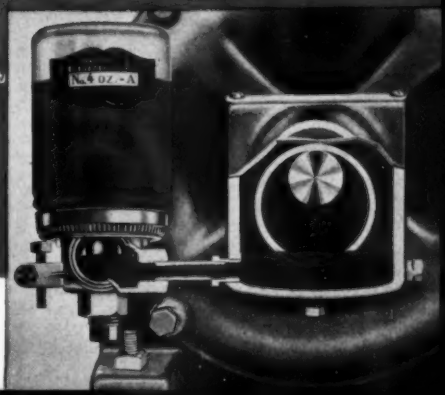
Order a set today. Convince yourself of the savings you can make in your tool room. ACRO PULLERS furnished in three sizes. Write now for more information.

Dual visibility — Sight glass on side of lubricator bowl an exclusive SUPER feature, shows exact oil level maintained in bearing plus oil supply in reservoir, eliminating guess work.

There is no drippage, no waste, no over flow. Oil is automatically fed to the bearings as required.

Nationally known authorities estimate that 75 per cent of all machinery repairs are caused by inefficient and improper lubrication, and that 85 per cent of the oil bought for lubricating purposes is never used by the bearing surface for which it was intended. WRITE FOR LITERATURE.

SUPER LUBRICATOR . . .



ACRO

PROMPT DELIVERY

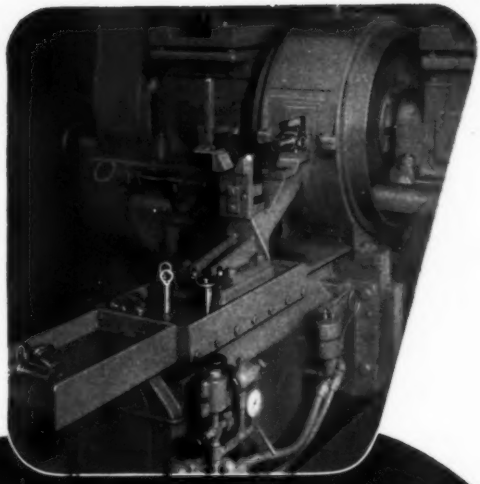
METAL STAMPING COMPANY:

332 E. RESERVOIR AVENUE
MILWAUKEE 12, WISCONSIN

SCRAP YOUR *Obsolete* EQUIPMENT

THE replacement rate of special-purpose tools, along with plant lay-out streamlining, is being stepped up today by most manufacturers, to reduce production costs.

One example is the grinding of steel propeller shaft slip yokes on TWO sides at ONE set-up, as shown here. A Gardner No. 125-26" Double Spindle Grinder with an air-draulically operated knee, is used to accomplish this mass-production efficiency.



Give a Thought To GARDNER-GRINDING In Your *Modernization* Plans!

PRODUCTION: 3 to 4 pieces per minute.

STOCK REMOVAL: .010" to .015" overall.

FEEDING: Hand load and unload to special fixture mounted upon an air-draulically operated table.

Compensate for increased labor costs and the growing need for reduced prices, by GARDNER-GRINDING parallel surfaces of parts used in your products.

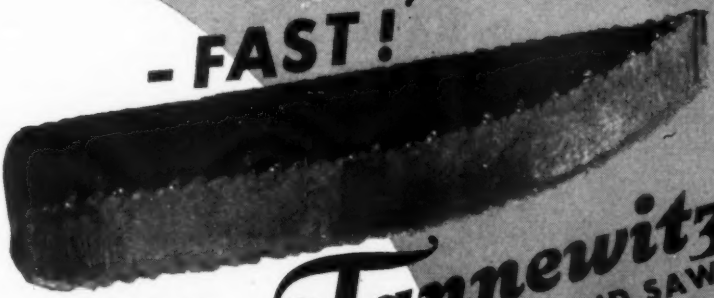
GARDNER-GRIND YOUR *Flat* SURFACES

Write for Data on GARDNER Double GRINDING!

GARDNER MACHINE COMPANY

436 East Gardner Street • • • • Beloit, Wisconsin, U.S.A.

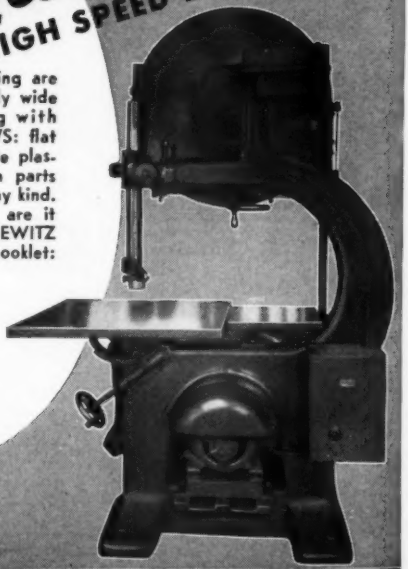
for Sawing METAL *as* HARD *as a* FILE
or Trimming FORMED PARTS
- FAST!



Actual photo of file friction sawn on Tannewitz High Speed Band Saw.

Tannewitz
HIGH SPEED BAND SAWS

Cost reductions that are downright amazing are effected in the cutting of an extremely wide variety of materials by friction sawing with TANNEWITZ HIGH SPEED BAND SAWS: flat sheets, hardened or soft steels, armor plate plastics, and many others. Formed aluminum parts can be trimmed without using a rest of any kind. Whatever your cutting problem, chances are it can be done faster and better with TANNEWITZ HIGH SPEED BAND SAWS. Write for booklet: "FRICTION SAWING."



THE TANNEWITZ WORKS
GRAND RAPIDS 4, MICHIGAN

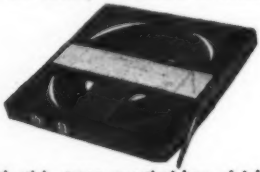
Specify ATLANTIC

BAND SAW BLADES

for Smoother

CONTOUR CUTTING

ATLANTIC SAWS meet all of your requirements for a superior blade on complicated die and fixture radius cutting. ATLANTIC specializes in accurate milled and precision set teeth, hardened to exact temper.



Atlantic's strong, practical box, plainly marked on sides and top. Remains in good condition until entire coil is used.

ATLANTIC'S special alloy steel insures longer wear and easier welding.

ATLANTIC'S one temper saw for all metals reduces stock you have to carry. Cut to length and welded, ready for use. Packed in strong Atlantic box. Write for new Atlantic Catalog.

Atlantic Saw Mfg. Co.

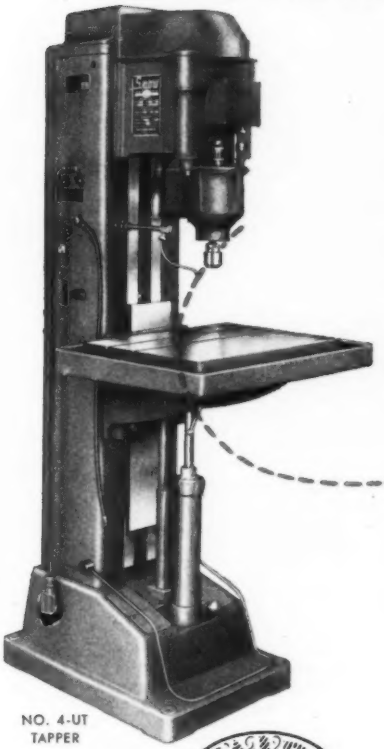
INCORPORATED

Exclusively Manufacturers of Band Saw Blades

153 Brewery St., New Haven, Conn.

AIR OPERATED • ELECTRICALLY CONTROLLED

FUNCTIONS *three* WAYS



NO. 4-UT
TAPPER

the *basic* SNOW AIR TOOL

Time-tested, quality-proven, thousands have been put into use in the past sixteen years. The Snow Air Tool — fundamental tool around which are built—the Snow Tapping Machine, the Snow Drilling Machine, the Snow Threading Machine.

Air operated—electrically controlled, it includes the latest in design. Quick-acting automatic holding fixtures are made fully automatic, semi-automatic or manually operated—all by the turn of a switch.

Send prints or sample parts for production estimates and for quotations. Or write for catalog.

TOOL
Snow
SNOW MANUFACTURING CO.
623 SOUTH CALIFORNIA AVENUE
CHICAGO 12 ILLINOIS

HEIM FLANGED TYPE ROLLER BEARING

A SELF CONTAINED, LOW COST, ROLLER BEARING

HEIM

The Heim Flanged Roller Bearing consists of an outer casing and an inner roller race formed from sheet metal, and a full complement of rollers. Accurate forming dies result in a uniformity of size and contour. Flanges retain the lubrication and exclude dirt and foreign matter. Ease of mounting and low cost make these bearings admirably suited to such equipment as factory trucks, wheelbarrows, casters, hoists, dollies, and a host of others where a dependable, low cost, self contained, anti-friction bearing is required. Please write for further details and a complete catalog of Heim bearings.

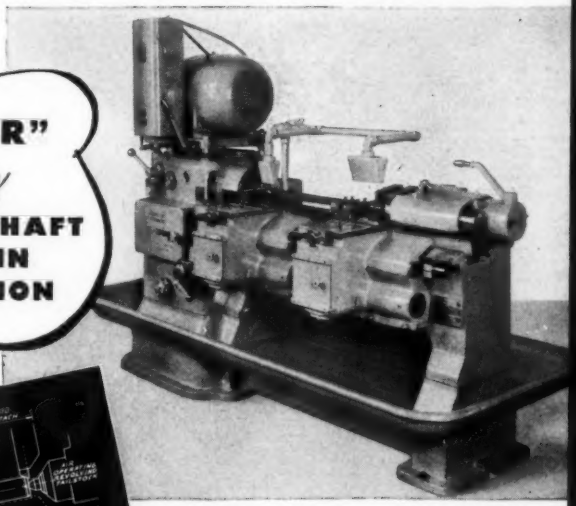
Other HEIM products include UNIBAL Spherical Bearings, Spherical Bearing Rod Ends, Die Polishing Machines

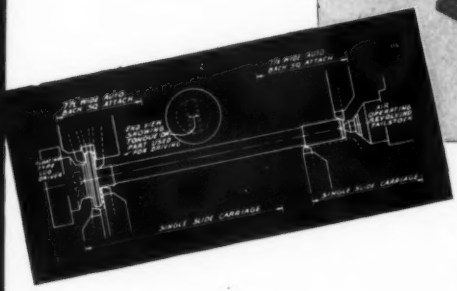
THE HEIM COMPANY
FAIRFIELD CONNECTICUT

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK

MODEL "LR"
Lo-swing
TURNS AXLE SHAFT COMPLETE IN ONE OPERATION





Problem: To provide a standard Automatic Lathe for turning both ends of automotive axles in one operation, using cemented carbide tools and fast cutting speeds.

Solution: The Model "LR" Lo-swing Lathe selected for this job was equipped with two independently operated front carriages and two rear facing attachments. All tool slides operate simultaneously, as shown in the line drawing, making for fast machine cycle.

The forging dies used for forming the flanged end of the shaft were first modified to obtain a driving tongue (shown on layout) which, used in conjunction with a special driver, will clear the tooling used for finish turning the different surfaces on the large flange.

The Model "LR" Lo-swing carriages are equipped with the Seneca Falls Quick Change-over mechanism. Change-over from one type of axle shaft to another is easily and quickly accomplished by setting two calibrated dials to the proper position, thus eliminating entirely the necessity for designing any special cams or tooling.

Our engineers are at your disposal for assistance with any of your turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

LATHE NEWS from SENECA FALLS

for Longer Life of Parts, Fewer Rejects, Use the Sunnen Precision Honing Machine on Internal Diameters from .125" to 2.625"

In your production shop, tool and die shop, or maintenance department there may be dozens of applications where you can improve the service life of parts that need straight, true, accurate holes. By using the Sunnen Precision Honing Machine on these jobs you can be sure of accurate fitting, smooth surfaces, and close tolerances that mean longer life, and smoother operation at low cost.

The accuracy produced by the Sunnen Precision Honing Machine is guaranteed to be within .0001" and has often been held much closer on production jobs. It is a versatile machine and will produce practically any commercial finish you may desire. This machine produces a true hole—free of bell-mouth, wave, taper, high spots or tool marks.

In addition, the Sunnen Precision Honing Machine operates in any metal, plastic or ceramic material except lead and babbitt—can be easily and quickly set up—is easy to operate, skilled labor is not required—maintains alignment between two holes—duplicates sizes easily—is low in cost and economical to operate.

For complete details, write for free bulletin, Form No. XSP5000, or ask a Sunnen engineer to call and show you how Sunnen Honing can be applied to your internal finishing jobs.

Sunnen Products Company
7935 Manchester Avenue
St. Louis 17, Missouri
Canadian Factory: Chatham, Ontario

SUNNEN

Typical Jobs

Universal bearing honed to 10 micro inch finish gives longer service.

Line reamer bushings, diameter 2.375", accuracy held to .0001".

Miniature aircraft cylinder—smooth, accurate honing provides better compression and longer life.

Automobile Distributor Shaft Gears. Taper removed at a rate of 80-90 per hour.

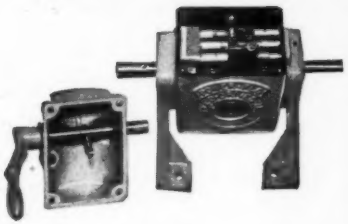
Compressor Yoke. Alignment maintained and better finish produced.

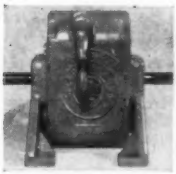
POWER-FLO

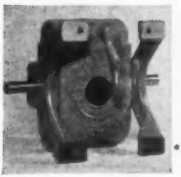
ENGINEERED TO FIT THE JOB AND THE MACHINE

MACHINE DRIVES — ½ to 20 HP

PRECISION BUILT FROM YEARS OF EXPERIENCE







★ **BELL-END MOUNTING**
MAKES POWER-FLO DRIVES EASILY ADAPTABLE TO ANY MACHINE DESIGN.

★ **POSITION-LOCKED SHAFT END-PLAY CONTROL**
PROVIDES LONG LIFE — QUIET PERFORMANCE — AND BEARING PROTECTION.

★ **BALL & SPRING LOCK SHIFTING MECHANISM**
ASSURES POSITIVE FULL MESH OF GEARS UNDER ALL LOADS AND AT ALL SPEEDS — MECHANISM IS FITTED IN CASE (NOT COVER) AND OPERATES THROUGH STURDY BRONZE ARMS WITH WIDE BEARINGS MOUNTED ON THREE RIGID GUIDE RODS.

★ **MACHINE FITTED MOUNTING BRACKETS**
COMBINE STRENGTH AND STREAMLINE DESIGN — EASY TO INSTALL.

THERE IS A POWER-FLO MODEL FOR ANY MACHINE FROM ½ TO 20 HP—INCLUDING AUTOMATIC SCREW MACHINES.

IMPORTANT: *THE BUILDERS OF POWER-FLO INVITE YOU TO MAKE THE MOST RIGID COMPARISON OF PERFORMANCE AND CONSTRUCTION BEFORE SELECTING A MACHINE DRIVE.*

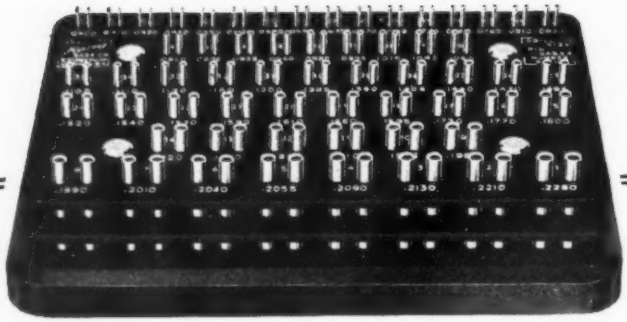
ASK YOUR DEALER FOR THE OPPORTUNITY TO MAKE THIS COMPARISON OR SEND YOUR REQUEST DIRECT TO

SPEED-DRIVES, INC.

23215 HOOVER ROAD E. DETROIT, MICHIGAN

P. O. BOX 303

EXPERIENCED DEALERS FROM COAST TO COAST



DRILL SIZE PIN GAGES

Class Z Accuracy

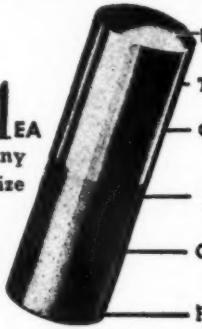
LETTER SET—52 gages in 26 pairs from A to Z, $45 set.

FRACTION SET—60 gages in 30 pairs in steps of 1/64" from 3/64" to 1/2", $50 set.

NUMBER SET — 120 gages in 60 pairs from 1 to 60, $90 set.

All sets include stands . . . Prices F.O.B. Bridgeport, Conn.

$1 EA any size



Sets in pairs of gages for checking any number of similar holes. Stands have 3 plates and cover so that gages stand upright. Drill size is plainly stamped in front of each gage hole, together with decimal equivalent to the ten thousandth of an inch.

IMMEDIATE DELIVERY — 116 SIZES

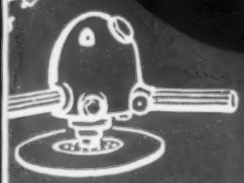
Check or M.O. should include .08c postage for quantities less than Set. Sets shipped Express Collect. No C.O.D.'s.

THE *Horberg* GAGE COMPANY

19 STAPLES STREET, BRIDGEPORT 1, CONN.

Surefire PROTECTION for AIR TOOLS & CYLINDERS

Norgren Lubricator



Oil the air that drives the tool, with Norgren Lubricators. Watch sluggish tools become peak producers!

Norgren Lubricators inject any set amount of clean oil into the airstream to create an oil-air fog which travels with the air. Coats all parts with a protective film of oil—smoother operation with less wear while tool works — positive protection against rust and corrosion while tool is idle.

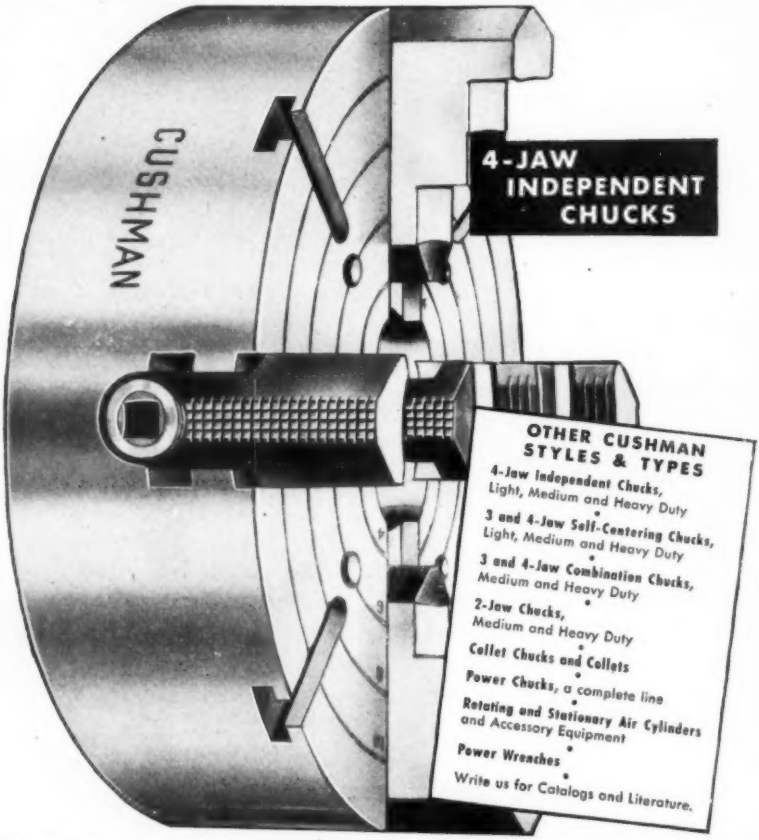
Easy to install in any airline. Automatic. Operates only while tool runs. Sight feed ends guessing.

Act now! Install Norgren Lubricators—the best air tool protection money can buy! Write for catalog No. 400. C. A. Norgren Co., 222 Santa Fe Drive, Denver 9, Colorado.

Norgren

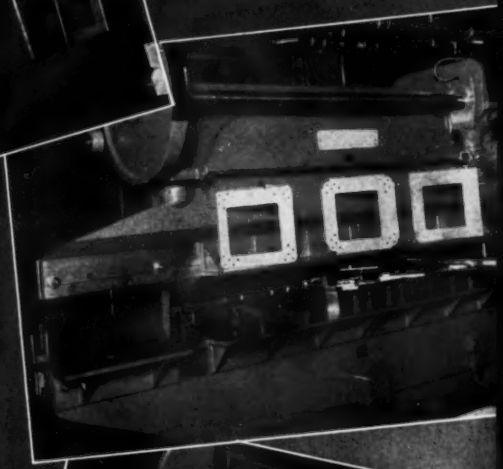
CUSHMAN

AMERICA'S FINEST • • A WORLD STANDARD FOR PRECISION


CUSHMAN
4-JAW INDEPENDENT CHUCKS
OTHER CUSHMAN STYLES & TYPES
4-Jaw Independent Chucks, Light, Medium and Heavy Duty
3 and 4-Jaw Self-Centering Chucks, Light, Medium and Heavy Duty
3 and 4-Jaw Combination Chucks, Medium and Heavy Duty
2-Jaw Chucks, Medium and Heavy Duty
Collet Chucks and Collets
Power Chucks, a complete line
Rotating and Stationary Air Cylinders and Accessory Equipment
Power Wrenches
Write us for Catalogs and Literature.

RECOMMENDED FOR general tool room and manufacturing use where a chuck of maximum general utility is required...the most widely used work holding equipment in any shop. Cushman gives you the utmost in precision plus ability to maintain accuracy throughout a long service life. The patented Cushman "Incomparable" self aligning thrust bearing and special methods of assuring perfect alignment of jaws within the bodies, make these the most accurate chucks of their type obtainable.

THE CUSHMAN CHUCK COMPANY
HARTFORD 2, CONNECTICUT, U. S. A.



MULTIPLE *Savings*

Here one Cincinnati Press Brake producing steel cabinets has replaced a battery of machines—changed repeated floor-to-floor handling to one simple hand-to-hand transfer. The work is merely passed from man to man along one machine to complete the series of operations.

Marring has been practically eliminated, product has been improved, investment lowered, floor space conserved.

Perhaps a similar saving might be effected in your shop. Send us your problem.

Write for Catalog B-2

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

This HY-PRO Ground Thread Tap will save money and boost production

When tapping at high speeds, this ground thread tap will usually produce at least 6 times as many threaded holes as a cut thread tap... with less power, less sharpening, less breakage.

A complete line of machine screw sizes

Prompt delivery. Many special as well as standard taps in stock.

Send for Catalog on company letterhead.

REG. U.S. PAT. OFF.
HY-PRO
TOOL CO.
New Bedford, Mass., U.S.A.

CHIP, CUT, DRILL, GOUGE

with Thor **PORTABLE ELECTRIC HAMMERS**

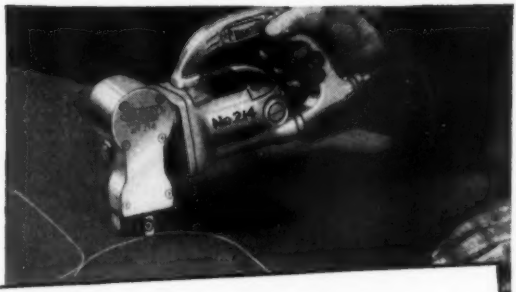
Thor U-100 Hammer with the "Sling Shot Drive"

1600 power-packed blows per minute with Thor Hammers save time and money on hundreds of construction and maintenance jobs. Use them in working stone, concrete, wood, metal and other materials. *Thor's famous shock-proof "Sling Shot Drive" puts more wallop into every blow.* YOU PROFIT BY LOWER JOB COSTS. Your nearby Thor distributor will gladly arrange a demonstration.

INDEPENDENT PNEUMATIC TOOL COMPANY
600 West Jackson Boulevard, Chicago 6, Illinois
BRANCHES IN PRINCIPAL CITIES

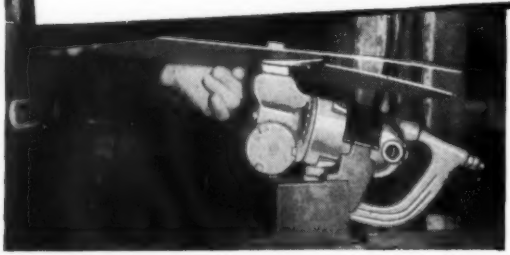
Thor **PORTABLE POWER TOOLS**

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS



Inside cuts easily made with a starting 3" hole.

In the hand or on the bench the UNISHEAR CUTS COSTS



Base and bracket of bench cradle for Unishear are made of cast iron.

● UNISHEARS are real production tools for cutting metal. They can be used as portable units or in a cradle for bench use. Operator can follow straight lines, curves, angles and notches. Inside cuts easily made from 1" starting hole. Circular cutting attachment for radii 2½" to 15". Blades may be adjusted quickly and easily. Comfortable grip handle on all models. Note duplex handle on Mighty Midget, No. 16A and No. 214. Ask your distributor to show you how the Unishear cuts costs for his customers. Stanley Electric Tools, 172 Elm Street, New Britain, Conn.

STANLEY

Trade Mark

HARDWARE · HAND TOOLS · ELECTRIC TOOLS

You can now

MOTORIZE YOUR KRW ARBOR PRESSES . . .

COMPACT MOTOR-DRIVE CONVERTS EXISTING KRW PRESSES TO HIGH PRODUCTION UNITS AT LOW COST

SIMPLE TO INSTALL *Immediate Delivery*

● Already, a great many owners of KRW Hand-Operated Presses have converted these presses to regular production units by equipping them with the new KRW Motor-Drive. These units . . . either air-oil or motor-driven . . . are available for 25, 50, 60 and 75-ton KRW standard presses. When power equipped, and utilizing simple, inexpensive dies, these standard presses are adaptable to a great many bending, forming, stamping and straightening operations . . . relieving heavier and more expensive equipment for other work. The Motor-Drive is easily attached to the press. Adding the unit in no wise affects the famous KRW two-speed hand pumping feature . . . press can still be hand-operated. Give us serial number of your KRW press and electric current requirements and we will quote you price and quick-delivery date. Put your idle or infrequently used KRW hand-operated Arbor Presses to work where they will pay big dividends . . . on your production line.

WRITE FOR LITERATURE DESCRIBING KRW MOTOR DRIVES AND MOTOR DRIVEN PRESSES 25 TO 75-TON MODELS AVAILABLE

K. R. WILSON, 215 Main St., Buffalo 3, N. Y.

Please send complete information on
KRW Motor-Driven Presses ☐
KRW Motor-Drive ☐

Serial No. of Press____ Voltage____ Cycle____ Phase____

Firm____

Address____

City and Zone____ State____

K. R. WILSON

215 MAIN ST. BUFFALO 3, N. Y.

THEY'RE NEW!

L-W Medium Duty 4-Jaw INDEPENDENT CHUCKS FOR SMALL LATHES

The bodies are semi-steel castings. Ground surface on face and outer edge. Steel jaws. Hardened and ground steps. Heat-treated steel screws.

RUGGED 8" MEDIUM DUTY
complete with wrench..... **$21.00**

6" HEAVY DUTY $16.95
complete with wrench.....

Also available for both sizes are completely finished, ready to mount adapter back plates with 1½"—8 thread suitable for some models of Atlas, Clausing, South Bend and Logan lathes, and rough adapter back plate castings which can be machined to requirements.

Finished adapter plate 1½"—8 thread for 8" Medium Duty Chuck.....	$3.60
Finished adapter plate 1½"—8 thread for 6" Heavy Duty Chuck.....	$3.00
Rough adapter plate for 8" Medium Duty Chuck	$1.50
Rough adapter plate for 6" Heavy Duty Chuck	$1.25

4-JAW Heavy Duty INDEPENDENT LATHE CHUCKS

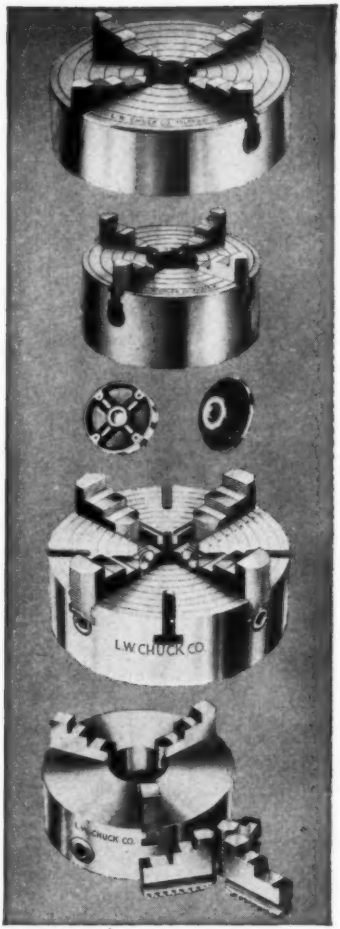
Sturdy, accurate. Hardened steel reversible jaws. Semi-steel body. Wide gripping surface, oversize, tough nickel steel screws, steel thrust bearings assure durability.

10" — $39.35 14" — $50.40
12" — $43.85 16" — $66.25
18" — $87.75

3-JAW UNIVERSAL LATHE AND SCREW MACHINE CHUCK

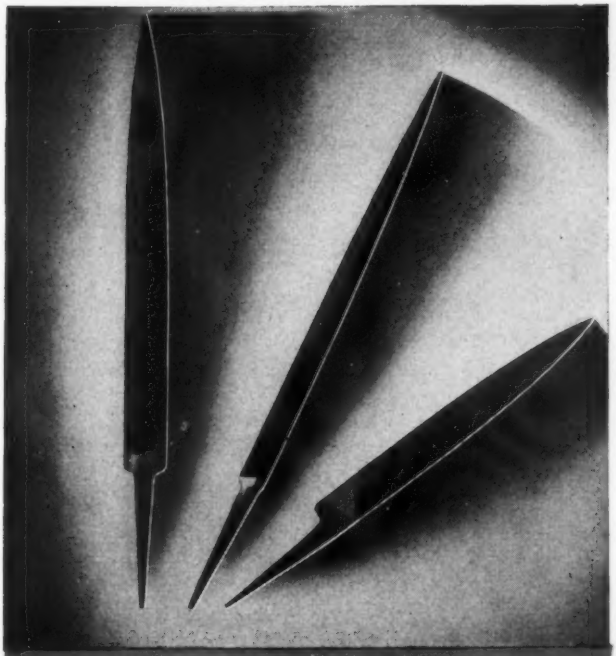
For light or heavy duty work. Guaranteed to run true. Hardened steel reversible jaws. Semi-steel body. High grade alloy geared scroll and steel pinions.

6¼" — $45.00 7½" — $55.00
10½" — $83.35



Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products

L-W CHUCK COMPANY 23 SO. ST. CLAIR ST. TOLEDO 4, OHIO



SEND FOR THIS POCKET SIZE CATALOG

over 5000 shapes and sizes

Grobet

PRECISION

SWISS FILES

THE ORIGINAL — YET THE MOST MODERN

BUY GROBET AND GET THE FILE YOU NEED

for a specific purpose — we do not attempt to substitute or sell "near as good". No one ever attempted to compile such a complete line — only GROBET has had the well over a century of performance and leadership in designing precision swiss files.

GROBET FILE CO. OF AMERICA

421 CANAL STREET NEW YORK 13, N. Y.

No. 11 Leach Surface Grinder

EXTRA LARGE CAPACITY
6″ x 24″ x 12″
HEIGHT 52″
WEIGHT 850 lbs.

$650

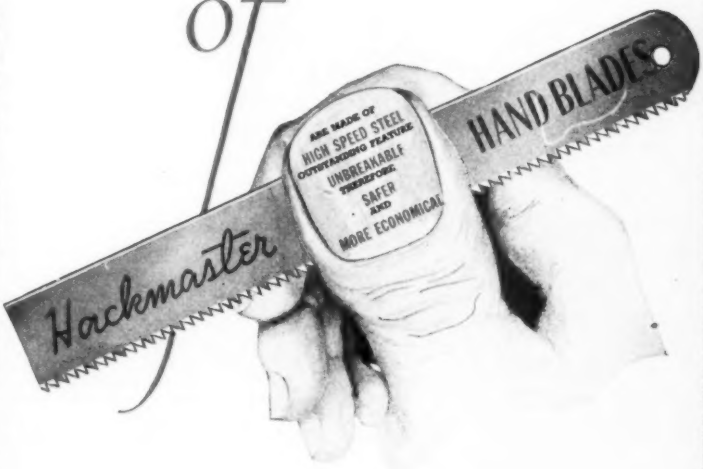
Complete with motor of standard Current characteristics F. O. B. Factory.

2 SPINDLE SPEEDS
2600 and 3500 R. P. M.

NATIONAL DISTRIBUTORS
H. LEACH MACHINERY CO.
387 CHARLES ST. PROVIDENCE 4, R. I.
AGENTS IN ALL PRINCIPAL CITIES

For further information write to Dept. L.

A Thumbnail description of

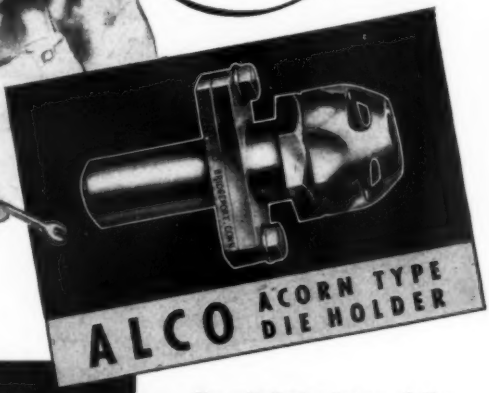


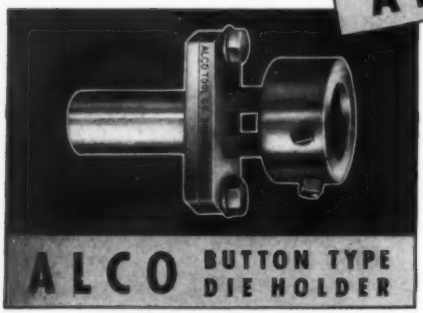
SOLD THROUGH DISTRIBUTORS

AMERICAN SAW & MFG. CO. SPRINGFIELD, MASS.

HACK SAWS · BAND SAWS · GROUND FLAT STOCK · TOOL BITS

I can set up **FAST** *with these* **ALCO** **DIE HOLDERS**





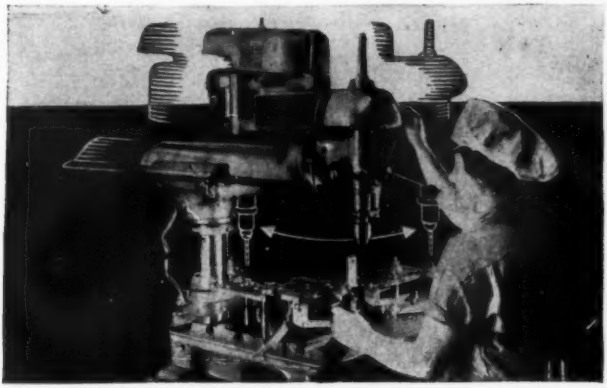
PROMPT SHIPMENTS NOW
ON BOTH TYPES

The self-aligning feature of Alco Die Holders is pointing the way for wise manufacturers to cut costs by reducing set-up time. Only three things to do . . . tighten die in die cap . . . run die slowly on work for correct alignment . . . tighten two studs in the flange and start production.

And don't overlook the lowly button die . . . it's simple but efficient when used in the Alco Button Die Holder.

ALCO EFFICIENT TOOLS

THE ALCO TOOL CO., 252 Birdseye St., Bridgeport, Conn.
Detroit Office: 2441 Field Ave., Phone DIXson 2434
Chicago Office: 608 So. Dearborn St., Phone Webster 2868



RADIAL DRILL, RD1175J. Head swings 180° to right or left and tilts at any angle from vertical to horizontal positions—can be operated at compound angles. Gliding ram travels 18". Drills to center of 62" circle. 16 spindle speeds from 110 to 8300 r.p.m. *Price: Less base and motor—**$423.00.**

...Head swings 360° horizontally (complete circle).

...Head swings 90° vertically (45° right and 45° left).

...Gliding ram travels 18".

...Drills to center of 62" circle.

...16 spindle speeds from 110 to 8300 r.p.m.

*Price: $423.00 less base and motor.

This Radial Drill is typical of a family of Walker-Turner metal working machines that are safe, fast and easy to learn to operate. It's the easiest way to meet ever changing production specifications with lowest overhead and operating costs.

The operator moves the drill to the work—many times on the piece shown. Full vision, easy manipulation—and speed without fatigue—all day long. A study of the specifications indicates how well it will do your present work and how quickly it can be adapted to a new product or a new material.

Walker-Turner Machines are also the easy way to reduce overhead costs. The Walker-Turner General Catalog will be sent on request. 42

*F.O.B. Plainfield—slightly higher west of the Rockies and in Canada
SOLD ONLY BY AUTHORIZED INDUSTRIAL MACHINERY DISTRIBUTORS

walker-turner
COMPANY, INC.
PLAINFIELD, N.J.
U.S.A.

MACHINE TOOLS

DRILL PRESSES—HAND AND POWER FEED • RADIAL DRILLS • RADIAL SAWS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

NEU-T-ROL
Magnetic Chuck Controls

DO YOU USE MAGNETIC CHUCKS?

If so, you need these modern aids for maximum chuck performance.

NEU-T-ROL Magnetic Chuck Controls speedily release and demagnetize workpieces. With NEU-T-ROL, there's no need to hammer or pry to release the work. This saves time and tempers — saves marred, distorted workpieces and prevents damaging of chuck faces. NEU-T-ROL also protects chucks against harmful voltage surges.

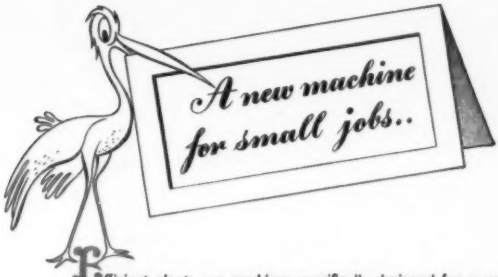
ELECTRO-MATIC Rectifiers are sturdy, heavy duty d-c current supply units, engineered to "stand up" day-after-day in the hardest service. They are available in 42 models in capacities ranging from 125 to 3000 watts.

NEU-T-ROL and ELECTRO-MATIC Rectifiers can be installed easily on equipment already in use — or built into new machines before delivery if you so specify.

Let us send bulletins giving full information—no obligation.

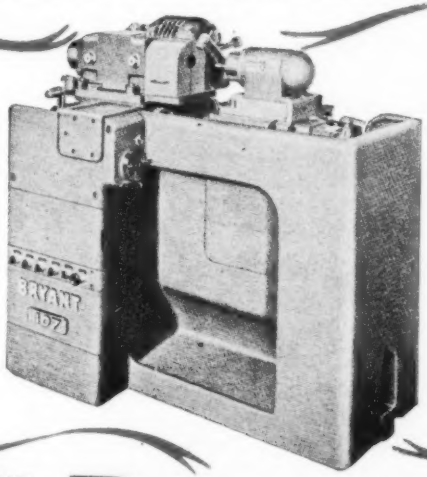
ELECTRO-MATIC PRODUCTS CO.
2235 North Knox Ave., Chicago 39, Illinois

ELECTRO-MATIC
Industrial Rectifiers



Efficient plants use machines specifically designed for a certain range of work sizes. For greatest efficiency in the grinding of small holes (⅜" to 3"), Bryant offers the new, small Series 107 Internal Grinder. ● The Series 107 is designed for tool room and small lot grinding. It has a chuck swing of 9 inches, a maximum traverse stroke of 6 inches and a maximum grinding stroke of 4 inches. Provision can be made for 11" swing. Preloaded ball bearings are used on both cross and longitudinal slides. This allows the use of a very light wheel slide, yet provides the utmost rigidity and sensitivity necessary for extremely precise work with quality finish. The new Series 107 uses the Bryant High Frequency Wheel Head as standard equipment. This provides direct wheel spindle drive at speeds up to 100,000 r.p.m., assuring the efficient surface speeds so necessary when grinding small bores. Belt drive is available for slow speeds. ● Although a minimum of floor space is required, operator comfort has been carefully considered. The simplified controls are conveniently located, and the operator may operate the machine, either when standing or sitting. Write for complete details on this new, small internal grinder that is functionally designed to grind small bores.

THE *NEW* BRYANT
SERIES 107
INTERNAL GRINDER
FOR SMALL BORES



Send for the Man from

BRYANT CHUCKING GRINDER CO.
SPRINGFIELD, VERMONT, U. S. A.

BRYANT

CRITERION *Boring* HEADS

Accuracy Accepted

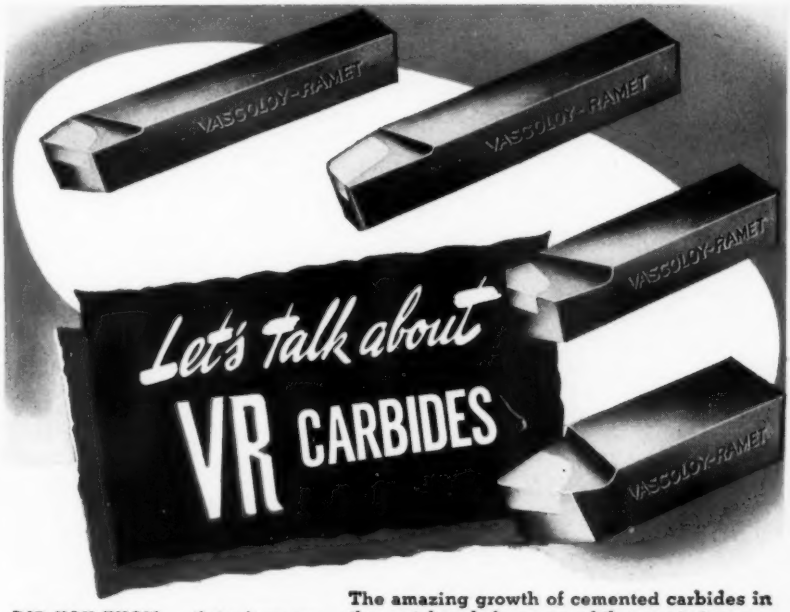
Extremely high accuracy is a standard feature of Criterion Boring Heads. Moreover, original accuracy is maintained far beyond normal expectation. Lead Screw is ground from solid AFTER hardening. Shanks interchangeable. Criterion Heads are in use throughout the nation.

Order from your dealer. Request free literature.

Write: Attention Dept. B

CRITERION MACHINE WORKS

BEVERLY HILLS, CALIFORNIA



DID YOU KNOW . . . that a large percentage of economy in carbide tool applications is wasted in converting standard tools to shop requirements. The practical solution to high tool conversion costs is V-R "CUSTOMER STANDARDS." Write or call your nearest Vascoloy-Ramet Field Engineer for full information on your "CUSTOMER STANDARD" tools.

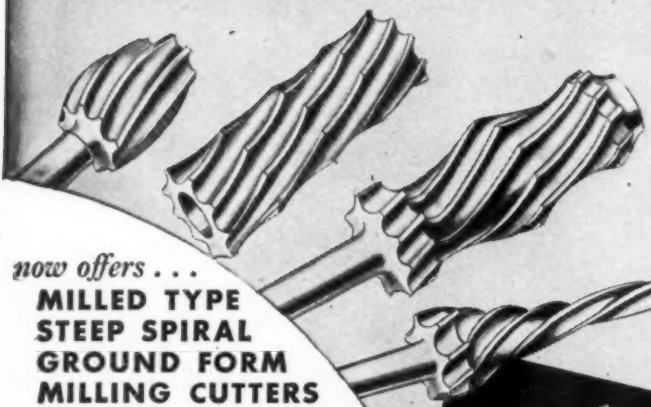
SEND for your copy of the NEW VR-400 Carbide Tool and Blank Catalog. 32 pages of vital carbide engineering data.
Address Dept. TE-247

The amazing growth of cemented carbides in the past decade has opened the way to tremendous production increases. Vascoloy-Ramet, manufacturers of V-R Tantalum/Tungsten carbides is foremost in the development of carbides in industry. In keeping with this tradition of leading industry in carbide tool performance, V-R now takes another significant step forward by introducing V-R "CUSTOMER STANDARDS." Studies reveal that most users alter standard carbide tools before putting them to work . . . an entirely unwarranted cost! BECAUSE TODAY . . . V-R "CUSTOMER STANDARD" tools, made to your design, can be used without ANY alterations, available in any grade and quantity at prices, less in fact, than it costs you to alter your present standard tools to shop specifications.

MAKERS OF WORLD'S FINEST VR Carbides

VASCOLOY-RAMET CORPORATION NORTH CHICAGO ILLINOIS, U. S. A.
District Sales and Service in Principal Cities
AN AFFILIATE OF FANSTEEL METALLURGICAL CORPORATION AND VANADIUM ALLOYS STEEL COMPANY

MOTOR TOOL *has done it again!*



now offers . . .

MILLED TYPE STEEP SPIRAL GROUND FORM MILLING CUTTERS

developed to exactly fit your requirements

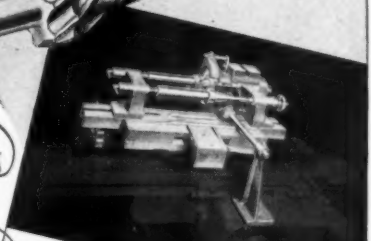
Steep spiral, milled type ground form milling cutters have not been produced in the past because no simplified means previously has been perfected for keeping them SHARP.

***Now*—MOTOR TOOL has developed a fixture for standard cutter grinders that keeps them razor sharp and true.**

As a result we are in a position to design and build such cutters up to and including 30-degree angle, right and left hand—with radii and angles of forms in either arbor or shank type construction.

Mail us blueprints of parts you want to mill. If arbor type, specify size of hole. If shank type, indicate shank dimensions. Price and delivery date will be promptly furnished.

Plus



a Means of Keeping Them

SHARP • FORM CONSTANT • TRUE

We do not advocate purchase of this NEW sharpening fixture unless you have sufficient volume to keep it busy. We will sharpen your cutters for you. 24 hour service if the need is urgent.

MOTOR TOOL MANUFACTURING CO.

METAL CUTTING TOOLS

7773 CORTLAND AVENUE • DETROIT 4, MICHIGAN

Make it a Rule to Call Motor Tool

SAVE TIME

STEP UP PRODUCTION!

"KNOCK-OUT" CHUCKS ARE FAST • POSITIVE • NON-SLIP

A twist of the wrist tightens or loosens this self-energizing chuck. The heavier the work-load the tighter its 3 hardened jaws grip the tool with a radial pressure that prevents twist or slip. Its fast, positive action saves time—saves tools—steps up production.

"KNOCK-OUT" EXPANDING MANDRELS STEP UP PRODUCTION ON TURNING, MILLING AND GRINDING OPERATIONS

SIMPLE—FAST—ACCURATE. "Knock-Out" Expanding Mandrels hold work from $\frac{3}{8}$" to $5\frac{1}{2}$" hole. Perfect support without distortion for thin wall sleeves—sure, positive grip on heavy pieces. Ideal for production or tool-room.

See your Dealer or mail the coupon TODAY for illustrated bulletins.

K. O. LEE COMPANY
1113 First Ave. S. E., Aberdeen, So. Dakota

Please send me illustrated bulletins on
☐ "Knock-Out" Keyless Chucks.
☐ "Knock-Out" Expanding Mandrels.

Name_____

Address_____

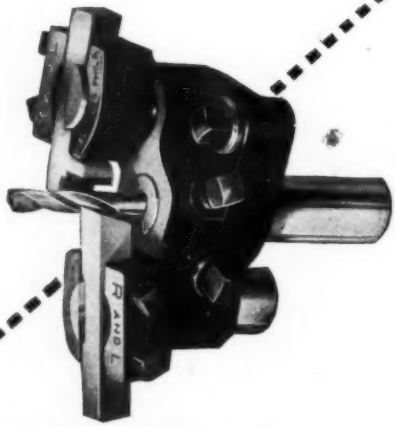
City_____ State_____

K.O.LEE COMPANY

MANUFACTURERS OF MACHINE TOOLS AND AUTOMOTIVE PRODUCTION EQUIPMENT

ABERDEEN, SOUTH DAKOTA

R and L RIGHT--> to



<--LEFT in 10 Seconds...

with R and L Turning TOOLS

Production savings are important in post-war work. Here is a tool that will save time and money in your shop.

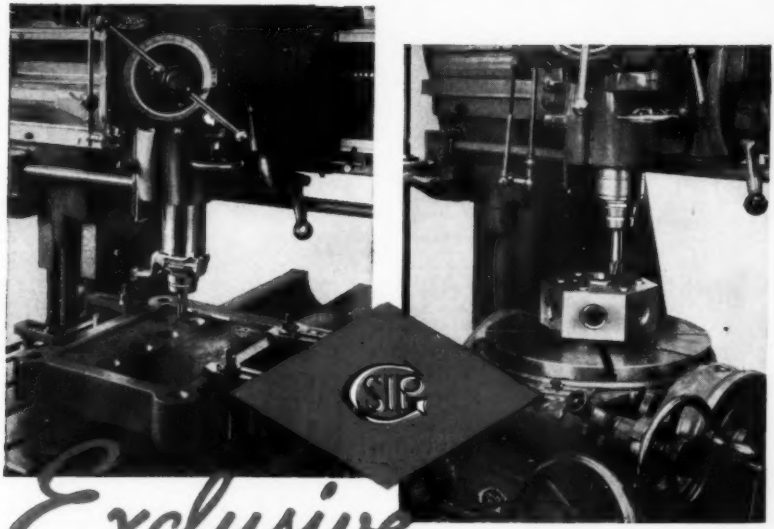
R and L tools increase production by reducing set-up time, by speeding cutting operations, by doing right and left hand turning and by performing several operations simultaneously.

One R and L Turning Tool takes the place of an assortment of 14 separate tools costing 4 times as much! R and L are made in five different sizes . . . and delivery can be made from stock.

Let us send booklet describing R and L Tap and Die Holder, Roller Backrest and Universal Tool Post.

R AND L TOOLS

1825 BRISTOL ST., NICETOWN, PHILADELPHIA 40, PA.

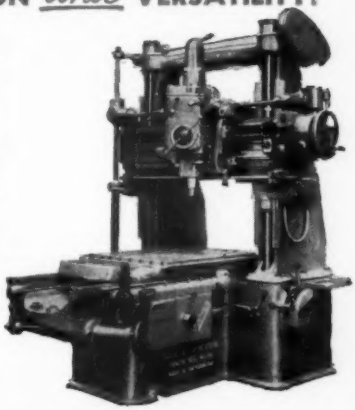


Exclusive

... PRECISION *and* VERSATILITY!

These two precision operations illustrate the extensive range of applications of the SIP HYDROPTIC-B, made possible by its exclusive adaptability for milling as well as jig boring and drilling. On the base plate for a piercing die, the milling as well as all the boring operations are performed by the HYDROPTIC-B Jig Boring and Milling Machine. On the second job, all six sides as well as the top surface of the turret head are machined in a single set-up, using the HYDROPTIC-B equipped with the SIP tiltable indexing table.

Combining hydraulic feeds for versatility and optical settings for the highest precision, the SIP HYDROPTIC-B Jig Boring and Milling Machine will answer your most exacting needs for toolroom and production operations.



SIP JIG BORERS
RANGE OF TABLE SIZES

No. 2C	.....	18" x10¾"
No. 2H	.....	27½"x12½"
No. 3K	.....	20½"x15"
No. 4G	.....	27½"x23⅝"
Hydroptic-B (illustrated)		39½"x32"

HIGH PRECISION MACHINE TOOLS AND MEASURING INSTRUMENTS

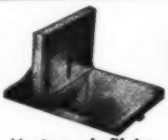
COSA CORPORATION

COSA

CHRYSLER BUILDING
New York 17, New York

TOOLS for PRECISION PRODUCTION

MEEHANITE is an engineering material with strength properties that place it in competition with other strong metals . . . *plus*, the many good properties of a good gray iron.



Masterangle Plates

Angle Attachments

Try Squares

MADE FROM

MEEHANITE METAL

Surface Plates
Masterangle Plates
Angle Attachments
Straight Edges
Flat Parallels
Universal Right Angles
Toolmakers' Knees
Try Squares
Angle Plates
Box Parallels
Lapping Plates

MEEHANITE represents an outstanding development in the metallurgy of gray iron. The process eliminates the undesirable variations of structural constituents which occur in common gray iron. A new material is created in which the structural form of the matrix and the quantity and distribution of the graphite are under actual control.

Write for Literature

COUNTERBORE

and

SPOT FACER

***with* MOVABLE INSERTED CUTTERS**

Made in 50 Standard Sizes from 9/16" to 3½" diameter. Features include — easy removal of cutter for sharpening, cutting edge of cutter always in same location, cutter locks securely, pilot drilled and tapped to hold different size bushings, etc.

PROMPT DELIVERY • WRITE FOR LITERATURE

PRECISION PRODUCTION TOOLS

ACME TOOL COMPANY

96 WARREN STREET • NEW YORK 7, N. Y.

The CONE AUTOMATIC MACHINE COMPANY

sees many

GOOD THINGS AHEAD

It is reported that . . . . . .

Danielson Mfg. Co. of Danielson, Conn., is making a soft hammerhead of nylon that won't chip or bounce.

get ready with CONE for tomorrow

Windshield glass can be kept warm when coated with an electrically conductive transparent film called "Nesa", manufactured by Pittsburgh Plate Glass Co.

be ready with CONE for today

Eastman Kodak's process of molding small lenses in an atmosphere of nitrogen promises, when manufacturing technique is refined, to produce lenses satisfactory for all but the most critical uses.

get ready with CONE for tomorrow

General Electric's new silicone paint is said to permit clearer, brighter colors for automobiles, refrigerators, electric ranges, etc., and to "last a lifetime."

be ready with CONE for today

Air Reduction Co. claims to have perfected a method of flame-cutting stainless steel to close tolerances at high speed without affecting the physical properties of the metal.

get ready with CONE for tomorrow

American Cyanamid Co. has installed hot water pipes under 600 feet of roadway connecting its plant with the highway. The heat will keep the road free from ice and snow.

be ready with CONE for today

The Mellon Institute has reported on the use of ethylsilicate as a vehicle in paint. Finishes made with it are said to resist heat, retard fire and not to darken with age.

get ready with CONE for tomorrow

C. G. Conn Ltd. has an electronic organ that produces its tones by vacuum tubes and is said to be equivalent to an organ with 1,333 pipes.

Bell Aircraft Corp. is making a vending machine mechanism that makes change.

be ready with CONE for today

The Dobeckmun Co. of Cleveland is making an aluminum foil yarn, protected by a plastic surface from corrosion, for use in textiles in combination with other yarns.

get ready with CONE for tomorrow

Seal Peel Inc., of Detroit, is sending a shipment of various products, protected only by plastic dip coating, on a round-the-world flight to test the value of this type of packaging in actual service.

be ready with CONE for today

Dow Chemical Company's "Styrofoam" is a pure white cellular insulating material with only 18% of the weight of cork.

Atlas Supply Co., makers of tires and accessories, is showing its wares in a showroom built inside a DC4 and called the "Sky Merchant."

get ready with CONE for tomorrow

Linde Air Products Co. calls its method of flame-cutting rock (as for oil wells) "fusion-piercing." It is said to have drilled holes as deep as 450 feet at an average rate of 10 feet per hour.

be ready with CONE for today

The "Solexol cold fractionation" process developed by M. W. Kellog Co. is expected to be used in seven plants now building throughout the world. The process resembles that used for petroleum, but is applied to many basic oils and fats including soy bean, linseed, tallow, sardine and shark liver.

get ready with CONE for tomorrow

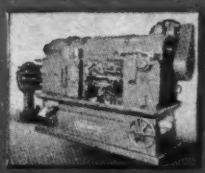
The R.C.A. electronic color television system will be made available to the entire industry

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

Impressive Conomatic!

This piece was produced from 2⅛" dia. S.A.E. 1112 by 18 tools in 12 seconds on a 2⅝" Eight-Spindle Conomatic.

Any good multiple spindle automatic should handle the ordinary run of work. But the tough jobs are profitable on Cones.



Ask your CONE representative to show you our new color motion picture

CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

37

Light the Job with Localites

Good seeing makes a big difference. In thousands of industrial plants, seeing efficiency has been increased greatly by putting good light on the job with Localites. These adjustable localized lighting units spot adequate illumination exactly where needed. They are vital tools for faster, more accurate, lower cost production.

Improve Worker Efficiency — Reduce Costs

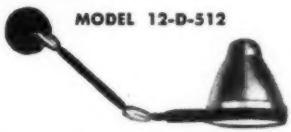
MODEL 10-D-508

Recommended for machine, bench, and table operations. 15" high base, 22" arm with two permatension flexible joints.

In excess of 200 Footcandles

$6.45 COMPLETE *(Net Industrial Price)*

MODEL 12-D-512



Excellent for certain precision machining, and small part assembly and inspection. 22" arm with two permatension flexible joints.

In excess of 250 Footcandles

$8.97 COMPLETE *(Net Industrial Price)*

MODEL 32-H-174-SV

Recommended for small machine work areas on lathes, grinders, drill presses, etc. 10½" arm with two open flexible joints.

In excess of 175 Footcandles

$4.13 COMPLETE *(Net Industrial Price)*

MODEL 26-X-512

Recommended especially for automatic screw machines. Can be mounted 20 ft. from work area and still give adequate light with 150 or 300 watt reflector spot lamps. Also takes 100 watt regular illuminating lamp.

In excess of 150 Footcandles

$4.62 COMPLETE *(Net Industrial Price)*

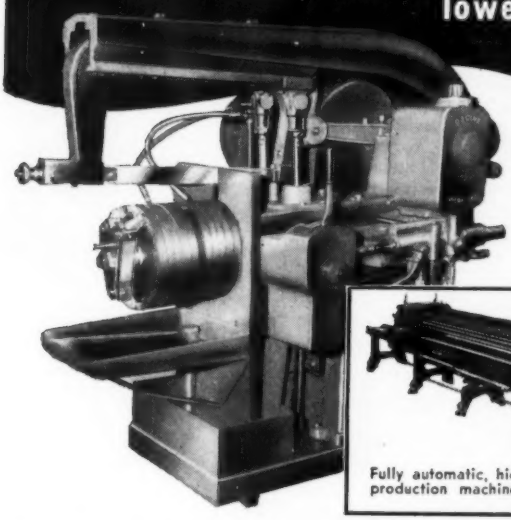
BALANCED LIGHTING
Fostoria
GENERALITES for Overall Lighting • LOCALITES for Light ON the Job
Trade Mark Reg. U. S. Pat. Off.

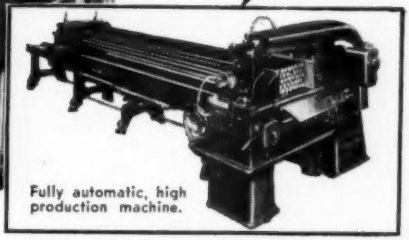
Write for literature on Balanced Lighting and complete selection of Localite models.

THE FOSTORIA PRESSED STEEL CORP.
FOSTORIA, OHIO
In Canada
Amalgamated Electric Corp. and all Northern Electric Branches

A RACINE METAL CUTTING MACHINE

lowers the cost of finished coils





Fully automatic, high production machine.

The special RACINE Machine shown here, cuts 10 ring gear blanks at one time. Ten cut off rings in 1½ minutes. A quick-acting, hydraulically actuated mandrel expedites loading, insures big production.

Metal cutting specialists for nearly forty years, RACINE can give you a quick and correct solution on all cutting off work. Many operations now performed in other more costly ways, may be easily handled on specially designed and tooled RACINE equipment. There is a full line of RACINE Machines in all capacities from 6" x 6" to 20" x 20". Included are fully automatic units that reproduce precision-cut duplicate pieces, at high production with a minimum of man hours. See the full line illustrated in our No. 12 catalog. Write today describing your work. Free production estimates furnished. RACINE TOOL AND MACHINE COMPANY, 1754 State Street, Racine Wisconsin.

RACINE *Oil Hydraulic* PUMPS and VALVES

For any power movement operation. Pumps are Variable Volume design, capacities 12 to 30 G.P.M. Pressures 50 to 1000 p.s.i. RACINE Sleeve Type Valves in ⅜" to 1½" sizes. Write for Catalog P-10-C.

RACINE

STANDARD FOR QUALITY AND PRECISION

bring production costs
down with

HOFFMAN FLOTATION

the only fully automatic coolant clarification process

Non-stop production is the cost-cutting method provided by Hoffman Flotation equipment. This fully automatic coolant clarification process requires no attention and since waste solids are discharged from the clarifier, this unit requires no cleaning — there are no strainers to become clogged.

These outstanding features are exclusive with Hoffman Flotation Equipment:

1. Fully automatic— no cleaning of the unit is required.
2. The system is a compact, self contained unit.
3. The action is entirely mechanical — no added material is necessary.
4. The treated coolant is completely clarified.
5. Ideally suited for all machining operations where the coolant is soluble oil and water.

U. S. HOFFMAN MACHINERY CORPORATION
215 Lamson St., Syracuse, N.Y.

COOLANT FILTERS • FILTRATION ENGINEERING SERVICE

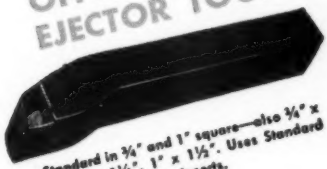
Announcing!

FOUR 1947 ADDITIONS

TO THE **SUPER** LINE OF

STANDARD CARBIDE TOOLS

OFFSET TYPE EJECTOR TOOL



Standard in ¾" and 1" square—also ¾" x 1", 1" x 1¼", 1" x 1½". Uses Standard Super Solid Carbide Inserts.

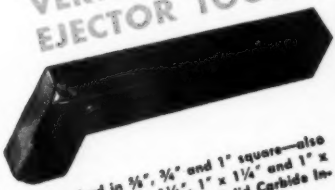
SUPER-GRIP HEX MASONRY DRILLS

A new premium quality Masonry Drill. Positive hex drive. No breakage due to slipping in loose or faulty chuck.

EXTRA LENGTH MASONRY DRILLS

For deep hole drilling. Stocked in ⅜" to 1½" diameters, and in lengths from 12" to 20". Fast—clean—accurate—quiet in operation.

VERTICAL TYPE EJECTOR TOOL



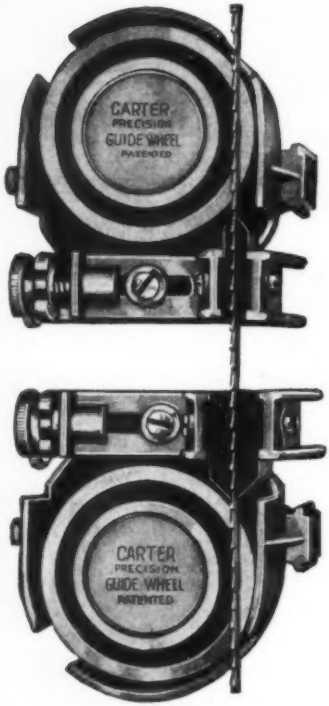
Standard in ⅜", ¾" and 1" square—also ¾" x 1", ¾" x 1¼", 1" x 1¼" and 1" x 1½". Uses Round Super Solid Carbide Inserts of suitable diameter.

WRITE FOR BULLETINS OR CALL OUR LOCAL REPRESENTATIVE

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Rd., Detroit 13, Mich. 5210 San Fernando Rd., Glendale 3, Cal.



MODERNIZE *your* BAND SAWS *with* CARTER MICRO GUIDE PRECISION GUIDE WHEELS *which*

enable you to safely speed your bandsaw wheels to 1800 rpm without fear of blade breakage or freezing and burning of bearing surfaces. Carter Guide Wheels will attain the amazing speed of 27,300 rpm. Increased speed and improved quality of work are definitely insured by installing Carter Guide Wheels.

Carter Products are nationally recognized as precision equipment for the modernization of lumber and woodworking equipment.

WRITE TODAY FOR PARTICULARS

TODAY'S CHALLENGE:

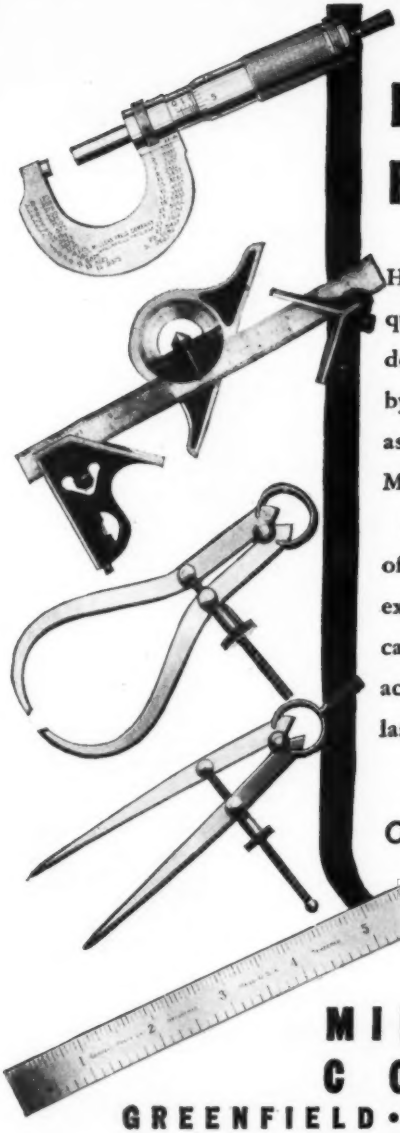
To obtain maximum production economically in order to meet increased labor and material costs. Modernization of existing equipment is basic to the solution of this challenge.

CARTER

PRODUCTS COMPANY

960 Michigan Trust Bldg., Grand Rapids 2, Mich.

Band Saw WHEELS • TIRES • GUIDES • GUIDE LIGHTS



BETTER TOOLS FOR BETTER JOBS

High quality work demands high quality tools . . . tools of advanced design made with the best materials by veteran craftsmen . . . tools such as those that bear the famous Millers Falls trademark.

Machinists' and precision tools of all types are included in the extensive Millers Falls line. You can rely on them all for utmost accuracy, perfect performance, and lasting durability. Write for details.

One thing in common - Quality

MILLERS FALLS TOOLS
SINCE 1868

MILLERS FALLS COMPANY

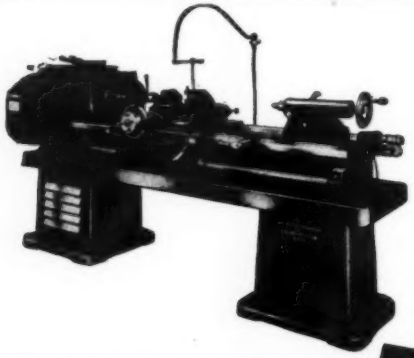
GREENFIELD • MASSACHUSETTS

40 YEARS of EXPERIENCE

produced

the new COULTER

AUTOMATIC THREADING LATHE



The many different and number of threading tools which can be arranged on the tool slides both front and rear, make this machine the most versatile of any for production of square, standard, and 29 degree threads, both internal and external.

Equipped with disc clutch . . . Easy to operate . . . Rigid Construction . . . Four speed headstock . . . Return or Idle travel speed has been increased five times cutting speed.

PRODUCTION MACHINES
SINCE 1896

Write for full particulars

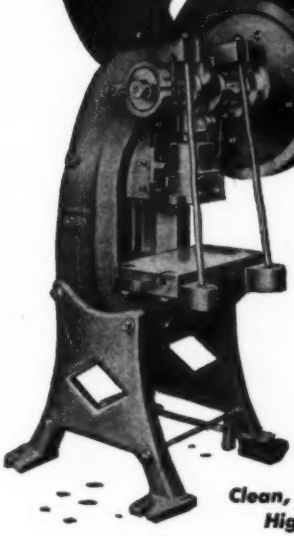
The James **COULTER** *Machine Co.*

BRIDGEPORT • CONNECTICUT • U.S.A.

First Choice FROM ALL ANGLES

...design
...workmanship
...performance

Diamond OPEN-BACK INCLINABLE PUNCH PRESSES



in 9 14 30 Ton Ratings

QUICK SPECIFICATIONS				
Model	Standard Stroke*	Shut Die Height	Frame Opening	Flywheel Speed
9 Ton	1½"	7"	5½"	185 max.
14 Ton	2"	9"	6½"	150 max.
30 Ton	3"	9"	10½"	125 max.

** Longer strokes available upon special order.*

Clean, streamlined appearance • Careful craftsmanship
High speed performance • Safe, easy operation

DIAMOND PUNCH PRESSES are among America's *finest* machine tools...Sleek and trim, yet designed for amazing strength. High overload capacity. Smoothly finished and accurately fitted in every detail. Production tolerances so close that parts are uniformly interchangeable!

If you want to punch holes in your production quotas, see these improved Diamond Punch Presses! **Available from dealers throughout the nation. *Write for FREE circulars!***

FEATURES

CRANKSHAFT—Chrome nickel steel—precision ground all over. Bearing surfaces finished to 20 micro-inches.

RAM—Bearing surfaces precision jig-ground, hand scraped for individual fit. Exclusive floating-type fully universal ball screw and nut maintains close alignment over full ram stroke.

GIBS—Precision sliding surfaces ground to 20 micro-inches.

CLUTCH—Positive, instantaneous contact with three sets of pins engaging flywheel.

FLYWHEEL—Extra heavy for smooth operation and maximum energy. Mounted on oversize bronze bushing.

FRAME—Massively constructed semi-steel castings, correctly designed for high overload protection.

DIAMOND MACHINE TOOL CO.

Dept. B • 3429 E. Olympic Blvd. • Los Angeles 23, Calif.

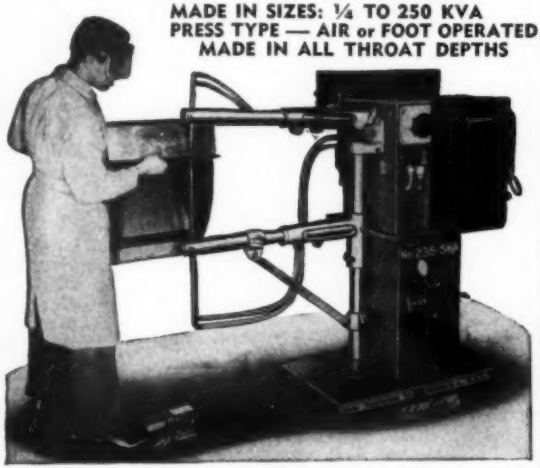
DIAMOND DTCo

MANUFACTURERS of the DIAMOND LINE of PRECISION MACHINE TOOLS and ACCESSORIES

SPOT BUTT ARC WELDERS

SPOT WELDER TIPS, HOLDER & HORNS
ASK FOR EISLER'S TIP & WELDER CAT

MADE IN SIZES: ¼ TO 250 KVA
PRESS TYPE — AIR or FOOT OPERATED
MADE IN ALL THROAT DEPTHS



Arc Welders
100 TO 400 AMPS.

Butt Welders

FOOT
AIR
MOTOR
OPERATED

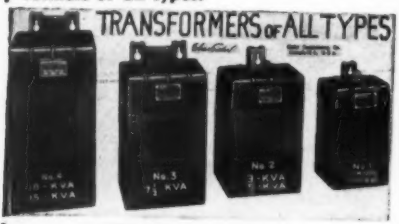
Spot Welders

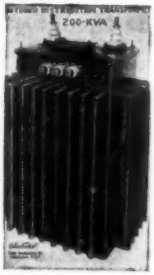
PRESS
TYPE

Spot Welders
FOOT, AIR
OR MOTOR OPERATED

WE MAKE ALL TYPES OF TRANSFORMERS
SIZES FROM ¼ TO 250 KVA **OIL COOLED TYPE**

TYPES: Furnace, Distribution, Lighting, Power, Auto, Phase Changing, Air, Oil or Water Cooled, Reactors and Special Transformers of all types.





CHAS. EISLER
EISLER ENGINEERING COMPANY
762 South 13th Street (near Avon Avenue)
NEWARK, NEW JERSEY, U. S. A.

CIRCULATING PUMPS

THE CLASS KRVS MOTORPUMP
Pressures 5 to 35 lbs. —
Heads 10 to 100 ft.
Capacities 5 to 125 gpm —
Sizes ¾, 1 and 1½ inches

The MOTOR PUMP

The Ingersoll-Rand Class KRVS Motorpumps are single-stage, single-suction centrifugal units with built-in electric motor. They are suitable for many applications in food, beverage, and dairy product plants... air conditioning systems... on machine tools... as integral parts of washing, cleaning, dairy, bakery and water conditioning machinery.

Motorpumps do not require a special foundation and can be mounted vertically, horizontally, at an angle or on the side.

Call your nearest I-R branch office or your local I-R distributor for complete details.

Ingersoll-Rand

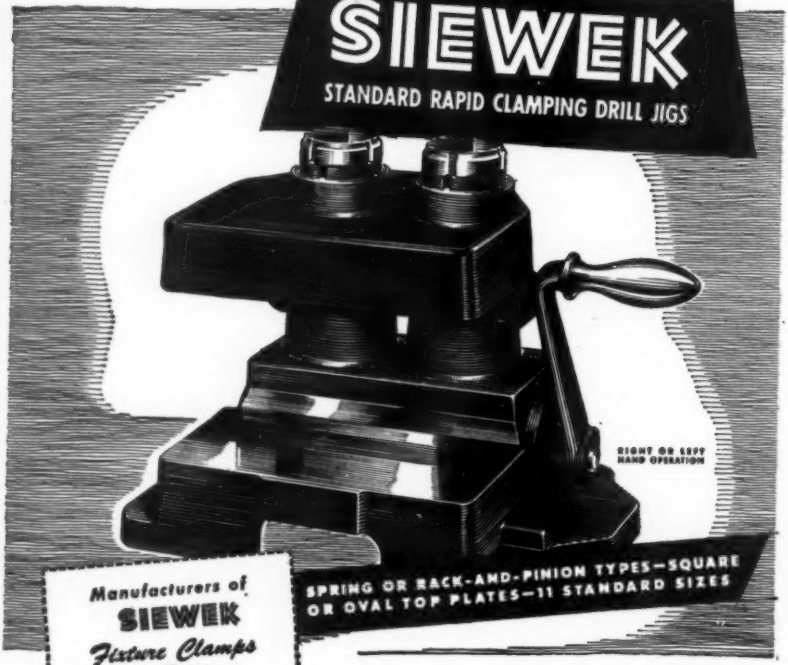
11 Broadway, New York 4, N. Y.

9-660

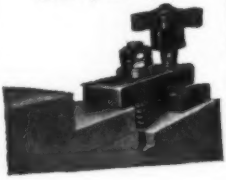
Simplify **DRILLING JOB SET-UPS WITH**

SIEWEK

STANDARD RAPID CLAMPING DRILL JIGS



Manufacturers of
SIEWEK
Fixture Clamps and Fittings



One Siewek Jig—with simple adapters that you make in your own shop—can replace many special jigs. Save designing and tool room time . . . Eliminate excess "idle time" for drill presses . . . Assure faster, easier set-ups and re-tooling operations.

Siewek Jigs are available in spring type for light work and rack-and-pinion type for heavier uses. Right or left hand operation. They are built to precision standards—sturdy and simple in construction.

Write today for Siewek Jig Catalog 6-J.

SIEWEK TOOL COMPANY

2862 East Grand Boulevard, Detroit 2, Michigan

Distributors in Principal Cities

Speed up your stud setting

MODERN SELF-OPENING STUD SETTERS

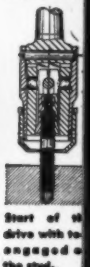
Used by practically all builders of automobiles, trucks, tractors and diesel engines.

A fast, economical and convenient means to greater production for those who have studs to set in quantity.

BECAUSE . . .

This tool does the job in a single continuous operation. It sets the stud, then opens automatically. No reversing. No backing off the stud.

Tool brought [illegible] position ov[illegible] stud, ready [illegible] begin drive.



Start of [illegible] drive with to[illegible] engaged [illegible] the stud.

Drive com[illegible] pleted. Clut[illegible] released.

Modern Precision Tools include . . .

- STATIONARY SELF-OPENING DIE HEADS
- ROTARY SELF-OPENING DIE HEADS
- STATIONARY COLLAPSIBLE TAPS
- ROTARY COLLAPSIBLE TAPS
- MODERN-MAGIC CHUCKS AND COLLETS
- SELF-OPENING STUD SETTERS
- INSERTED BLADE FACE MILLING CUTTERS
- SOLID ADJUSTABLE DIE HEADS
- ADJUSTABLE HOLLOW MILLING TOOLS
- UNIVERSAL CHASER GRINDING FIXTURES

[illegible] can be operated in any position with either air or electrically operated portable tools. It can also be used in a drill press, where it is possible to drill and tap the holes and set the studs in successive operations.

For Full Information, Send for Bulletin M-186

MODERN TOOL WORKS

DIVISION OF

CONSOLIDATED MACHINE TOOL CORPORATION

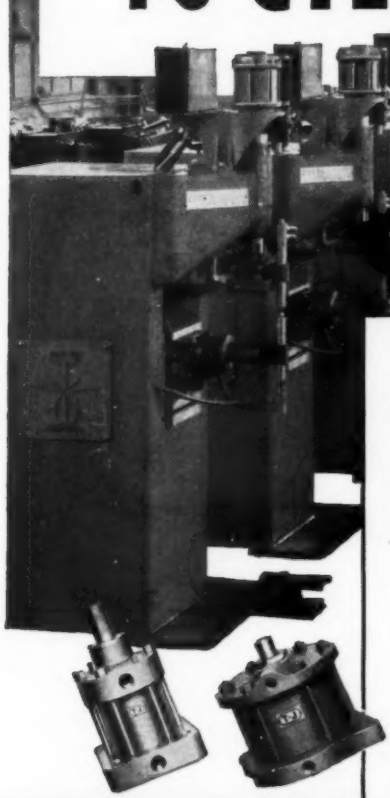
ROCHESTER 10, NEW YORK

ENGINEERED LIVE CENTERS

A properly designed Live Center is one of the fundamentals of setting up a job and requires a specialist's experience. Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat shock and excessive thrust loads—reducing wear to a minimum. Send us your blueprints and specifications—we will see that your job gets set up with the right Live Center. Standard shanks with Morse taper carried in stock.

STURDIMATIC TOOL COMPANY
5220 THIRD AVE., DETROIT, MICH.
LIVE CENTERS

Press Welders with
T-J CYLINDERS



HIGH OPERATING SPEEDS

LOW AIR CONSUMPTION

In these air-operated press welders manufactured by The Taylor-Winfield Corp., Warren, Ohio, T-J Cylinders contribute to the rapid and efficient operation of the machines. The cylinder is employed to move the welding head to the work and return—a job performed by T-J with *accuracy, speed* and *dependability!*

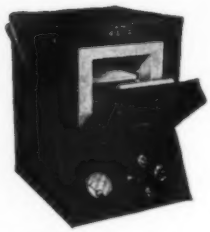
This is typical of the widespread use of T-J Cylinders today to simplify operations and save time and labor. There's a T-J Air or Hydraulic Cylinder *exactly right* for all kinds of tough jobs where pushing, pulling or lifting is needed . . . 100 lb. or 50,000 lb. Available in many standard sizes and styles . . both cushioned and non-cushioned types. Backed by 30 years of know-how . . . T-J engineered to do the job *better* and *cut costs!* Write for latest catalogs. The Tomkins-Johnson Co., Jackson, Mich.

FOR POWER MOVEMENT IN ANY DIRECTION

TOMKINS-JOHNSON

VISITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHORS

T-J



LUCIFER

ELECTRIC HEAT TREATING FURNACES

WITH AUTOMATIC HEAT CONTROL

Just what you have been waiting for. Electric heat treating furnaces that are easily operated; you can do your own heat treating — harden and temper dies, punches, gauges, jig and fixture parts, normalize weldings and castings. It's easy with a "LUCIFER" because it has the "LUCIFER" automatic electric heat control that permits stepless control of any predetermined heat within its range up to 2000° F. All "LUCIFER" furnaces are equipped with indicating built in pyrometers calibrated both in Fahrenheit and Centigrade, pilot light, control switches and automatic control devices. You can now equip your old Furnace with a Lucifer Automatic Heat Control unit 115 or 230 V. A.C. up to 5 K.W., from $27.50 to $41.50 complete. We can also supply a 7 day Control, which will turn your furnaces on in the morning and off at night, shut off at noon Saturday, skip Sunday and repeat each 7 days. $27.50 complete. All prices are F.O.B. factory Philadelphia, Pa.

SPECIFICATIONS

- *Interior size*—Model 7051—5½"x5½"x6"
- *Exterior size*—15"x15"x17"
- *Operation*—115 V. A.C. only
- *Rating*—1.2 K. W.
- *Ship. Wt.*—Approx. 85 lbs. *Operating cost*—Approx. 3c per hr.

PRICE $112.00 f.o.b. Factory, Philadelphia

SPECIFICATIONS

- *Interior size*—Model 7053—8"x8"x10"
- *Exterior size*—18"x20"x24"
- *Operation*—115 V. A.C. or 230 V. A.C.
- *Rating*—3 K.W.
- *Ship. Wt.*—Approx. 225 lbs. *Operating cost*—Approx. 6 to 8c per hr.

PRICE $188.00 f.o.b. Factory, Philadelphia

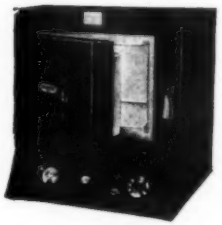
SPECIFICATIONS

- *Interior size*—Model 7052—12"x12"x10"
- *Exterior size*—22"x22"x24"
- *Operation*—230 V. A.C.
- *Rating*—4.8 K. W.
- *Ship. Wt.*—Approx. 350 lbs. *Operating cost*—Approx. 10 to 14c per hr.

PRICE $260.00, f.o.b. Factory, Philadelphia

DEALERS:

Write for our interesting offer to qualified distributors. Desirable territories open.



DISTRIBUTORS

CHICAGO, ILL.
Donahue Steel Products Co.
74th St. & Damen Ave.

Cleveland, Ohio
Maslo Machinery Co.
2443 Prospect Ave.

Huntington Park, Calif.
Reagan Company
6409 Santa Fe Ave.

Milwaukee, Wis.
Curt Loeser
4213 N. Newhall St.

Minneapolis, Minn.
The Satterlee Co.
118 Washington Ave. North

New York
Lafayette Tool & Supply Co.
128 Lafayette St.

Omaha, Nebr.
Fuchs Machinery Co.
Jackson at 13th St.

Philadelphia, Pa.
Wilson Steel & Tool Co.
P. O. Box 193,
Upper Darby, Pa.

Providence, R. I.
H. Leach Machinery Co.
387 Charles St.

SOLE SELLING AGENT . . .

GILBERT S. SIMONSKI
401 N. BROAD ST., PHILADELPHIA 8, PA.

NEW features that mean Better Tapping

This new high speed Procunier Tapping Head is the answer to your toughest tapping problems. It is a precision machine which assures greater tapping accuracy at high speed — with less tap breakage. Check these new Procunier features:

√ New double-cone cork faced friction clutch engages the conical surfaces of the drive and reverse shells, driving the tap with a soft "cushioned" action.

√ New clutch instantly "slips" if tap strikes bottom or sticks—reducing tap breakage.

√ High sensitivity of Procunier Tapping Head makes it possible to quickly detect dull or "loaded" taps by the pressure needed to drive them.

New Procunier "Tru-Grip" Tap Holder

Cross section of "Tru-Grip", showing positive drive to tap.

√ Procunier Tapping Heads have heat treated gear mechanism, ball bearings, light weight aluminum housings as well as many other advanced features.

A complete line of Procunier Tapping Heads is available, including Cover Clamping models—write today for illustrated bulletins.

Procunier

Safety Chuck Company

14 S. Clinton St., Chicago 6, Ill.

Procunier Safety Chuck Co.
14 S. Clinton St., Chicago 6, Ill.

Send me bulletins on ☐ Procunier High Speed Tapping Heads ☐ Procunier "Tru-Grip" Tap Holders ☐ Universal Tapping Machines.

Name .....

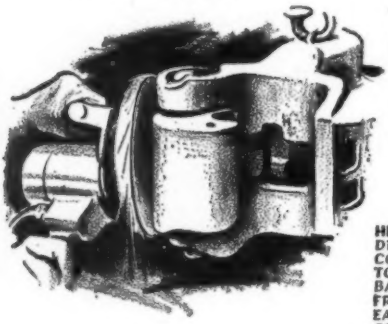
Address .....

City..... State.....

Abrasives for BAR POLISHING

THE CHANCES ARE THAT SPECIALLY-PROCESSED JEWEL NATURAL GARNET WAS THE "SANDING" MEDIUM THAT BROUGHT OUT THE FULL, MELLOW BEAUTY OF THIS WOODEN BAR. NATURAL GARNET HAS LONG BEEN NOTED FOR ITS UNIQUE ABILITY TO BRING OUT ALL THE LATENT BEAUTY OF WOOD, AND JEWEL GARNET COMBINES THIS ATTRIBUTE WITH THE ABILITY TO DO IT FAST.

AND THIS BAR GOES INTO A TYPEWRITER. IT HAS TO BE EXACTLY THE RIGHT THICKNESS. SMALL FINE DISCS OF JEWEL ABRASIVE GRIND THESE DELICATE TYPE BARS TO A PRECISION FIT, EVENLY, QUICKLY AND SMOOTHLY . . . AND TO SPLIT-THOUSANDTHS OF AN INCH ACCURACY.



HERE'S STILL ANOTHER KIND OF BAR—CALLED A DRAW BAR. THIS IS THE HIGHLY IMPORTANT COUPLING MEMBER THAT FASTENS RAILWAY CARS TOGETHER. CALCULATE THE STRENGTH THESE BARS HAVE TO HAVE IN ORDER TO PULL 130 FREIGHT CARS, EACH WEIGHING 30 TONS AND EACH LOADED WITH 40 TONS MORE. WELDISKS GRIND THESE HARD, TOUGH FORGINGS QUICKLY AND SAFELY.

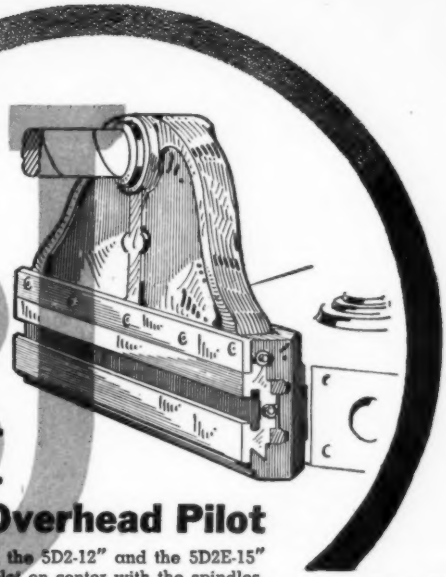
Remember Jewel Abrasives next time you order from your jobber. There's a Jewel product for every grinding and polishing job.

Abrasive Products, Inc.

SOUTH BRAINTREE 85, MASSACHUSETTS · MAKERS OF JEWEL COATED ABRASIVES

STANDARD HORIZONTAL SLIDE TOOL

. . . With Overhead Pilot



This versatile tool is one of a broad line of production aids available for reducing manufacturing costs.

Designed for use on the 5D2-12" and the 5D2E-15" machines — with T-slot on center with the spindles, maximum rigidity is secured by the overhead Pilot. These fixtures are available for both five and six face Turrets. The obvious sturdiness and rigidity of the horizontal slide for holding the cutter blocks is assurance of rapid and accurate stock removal to the limit of the cutters. The Slide Tool T-slot has ample space for cutter blocks to machine work pieces at the front and at the rear of the double-spindle, double-production machines.

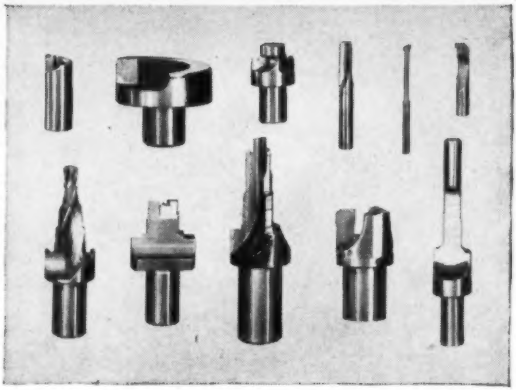
This Slide Tool also may be used for internal recessing cuts, as well as for taper boring or turning with the proper cam path fastened to Cross Slide Base of the bed of machine.

Production cost will be a critical factor in the post-war world. This helpful catalog will present you with many constructive ideas that will assist you in making your Potter & Johnston machines more productive. If you are a user of our machines it will be sent to you, on request.

The POTTER & JOHNSTON MACHINE CO. PAWTUCKET, RHODE ISLAND

J&S "TOOL SENSE" reads between the lines of your FORM-TOOL specifications

Concentration on the production of the most intricate Form-Tools for many years, enables us to "sense" the idea behind a customer's blue print. Even though the designer may find it hard to put his exact thought on paper, we can usually "fill in the blank spaces." This "tool sense," plus extremely rigid inspection at every step in production, save our customers costly delays due to rejections.



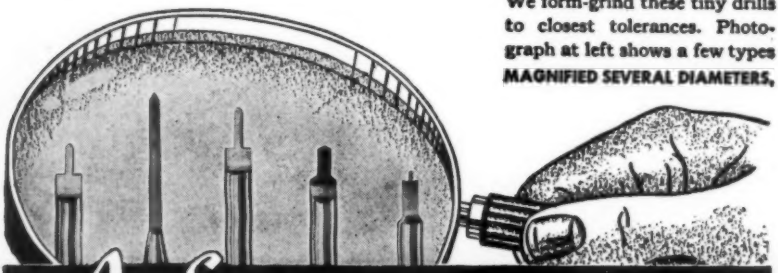
Among the Form-Tools we produce are: counterbores, cold-heading dies, countersinks, taper reamers, gun drills, flat drills, end cutters, boring tools, step drills, hollow mills, recess tools and combination tools. Send us your blue prints for quotation today.

J & S Spiral Form-Tools

J & S equipment of exclusive design, reducing man-hours required to form-grind Spiral Tools, now makes them economical for many more applications.

J & S Form-Tools for makers of Watches, Clocks and Meters

We form-grind these tiny drills to closest tolerances. Photograph at left shows a few types **MAGNIFIED SEVERAL DIAMETERS.**



J & S TOOL CO. 477 Main St. East Orange 2, N. J.

Manufacturers of "Fluidmotion" Fluid and Angle Dressers

If so, Insist on CONTINENTAL Broaches

Broaching may give you unusual opportunities for increasing production, reducing unit cost, holding closer tolerances, and improving finish . . . *all necessary to manufacture successfully in 1947!*

Continental Tool Works is a leader in the field of broaching, a process now widely used throughout the metal-working industry as one of the fastest methods to remove stock to precision limits.

Continental broaches are ground by skilled broach-makers to exceedingly close tolerances. Extreme care in design and workmanship insures that each Continental broach is fitted exactly for the job it is intended to do. These are reasons why Continental-made broaches produce more parts per grind, more grinds per broach. Write to Continental today for folder No. 12791, *"Problems Solved By Broaching."*

CONTINENTAL TOOL WORKS
CTW
EX-CELL-O CORPORATION

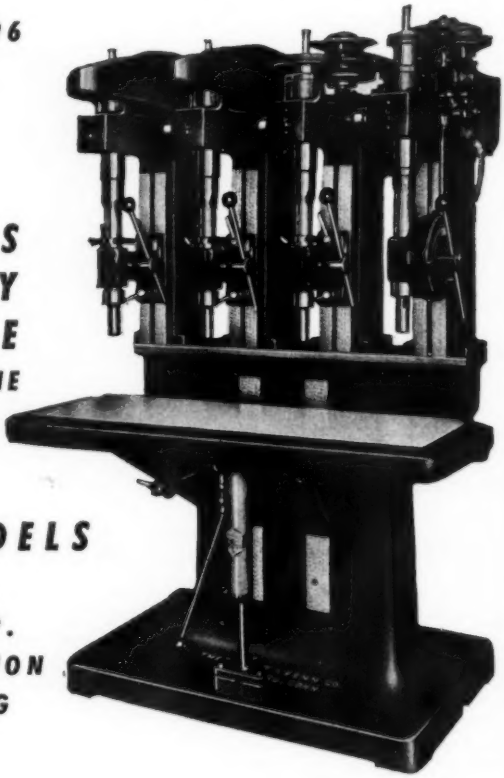
CONTINENTAL TOOL WORKS

DIVISION OF EX-CELL-O CORPORATION

DETROIT 6, MICHIGAN

THE DRILL WITH
A HUNDRED AND ONE SPEEDS

4 SPINDLE M96
RIGHT HAND
SPINDLE
POWER FEED



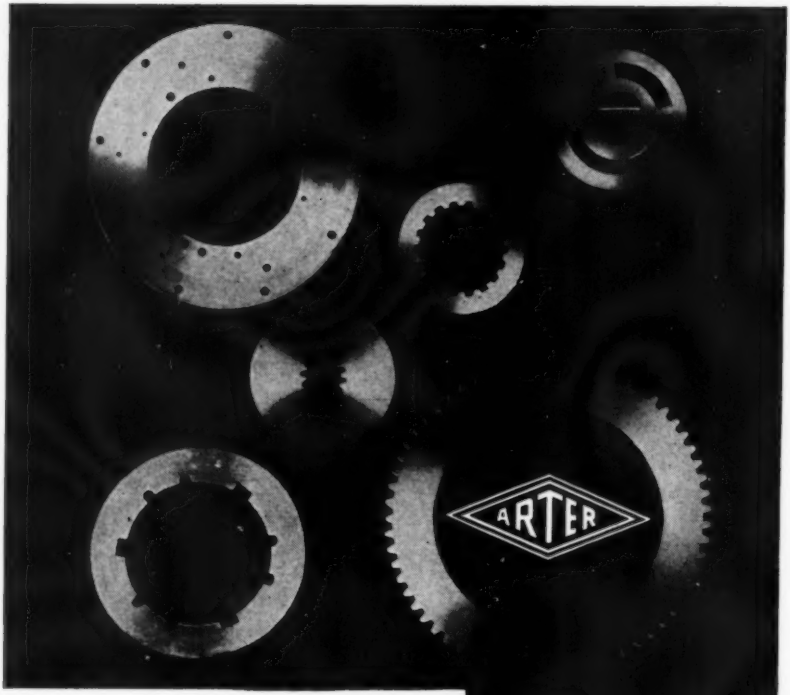
ALL SPEEDS
INSTANTLY
AVAILABLE
WHILE MACHINE
IS RUNNING

TWO MODELS
M96—⅞ CAP.
M125—⅜ CAP.
BOTH PRECISION
BALL BEARING

SEND FOR CIRCULAR

THE TAYLOR & FENN CO. HARTFORD 1, CONN.

TRAVELLING TUBE CUTOFF
for use with
WELDED TUBE ROLLING MILL
ETNA
• Cuts tube to desired lengths directly from the mill and unloads.
• Travelling head is electrically oscillated and synchronized with the mill to insure cutting to accurate lengths.
• Can be readily installed on any mill.
Write for complete information.
THE ETNA MACHINE CO.
TOLEDO 10, OHIO



Typical ARTER Versatility

Flat circular work requiring perfect parallelism . . . extreme flatness . . . exact thickness . . . with a particular degree of finish required. All easily obtained on

ARTER
Rotary Surface Grinders

ARTER GRINDING MACHINE CO.
WORCESTER, MASSACHUSETTS • U. S. A.

"ALIGNMENT TROUBLE DISAPPEARED WHEN WE INSTALLED NEOPRENE MOUNTED TOOL-FLEX HOLDERS"

Said C. A. Anderson, General Shop Foreman of Peerless Pump Division of the Food Machinery Corporation in Los Angeles, California.

The carbide tip reamer shown above is being held by a **Tool-Flex Holder Model D-4.** The automatic turret lathe is one of eighteen 2-F Gisholt Fastermatics equipped with Tool-Flex Holders.

The reaming is to a .0005ths tolerance on bronze bushings in Peerless Pump bowls, and the self-centering feature of Tool-Flex always keeps the reamer in perfect alignment.

Only 4 parts are used to make Tool-Flex Holders: 1. Oil-resistant, Neoprene mounting, 2. Shank, 3. Collet and 4. Adjustable retaining ring.

Besides reaming, Tool-Flex Holders are used for tapping, honing and counterboring on multiple operations; automatic or hand screw machines; turret or engine lathes; and radial drill presses. Users tell us that besides correcting misalignment, positive-drive, universal action Tool-Flex Holders cut set-up costs, reduce tool breakage, and eliminate chatter and bell-mouthing.

We invite problems in multiple tapping or drilling operations. Our engineering department is available for free consultation. Write us at Dept B.

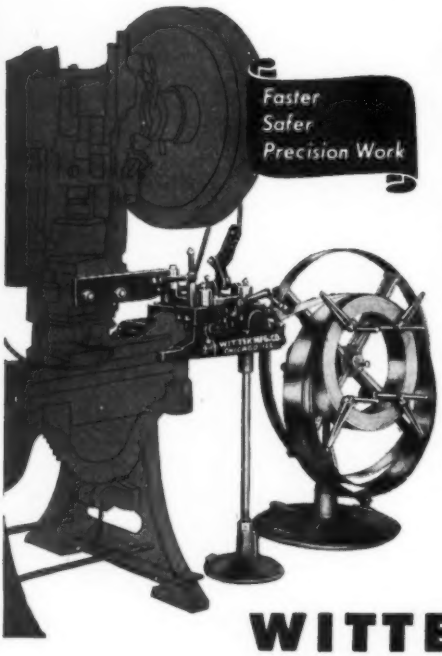
Model "D" with straight shank and taper collet is one of 40 Tool-Flex Models

Burg Tool Manufacturing Co.

5028 W. JEFFERSON BLVD., LOS ANGELES 16, CALIF.

Planning Peacetime Production Using Coiled Strip Stock?

Equip with
WITTEK
Automatic Roll Feeds and Reel Stands



Wittek Roll Feeds are being used extensively by war plants in their large volume production of high quality metal stampings. The flexibility of Wittek Roll Feeds will assist these plants in their peacetime conversion through their adaptability to various jobs. Keen competition will demand the utilization of equipment to its point of highest efficiency. If your postwar plans include punch press production of parts from coiled strip stock—investigate now the many possibilities of Wittek Roll Feeds and Reel Stands.

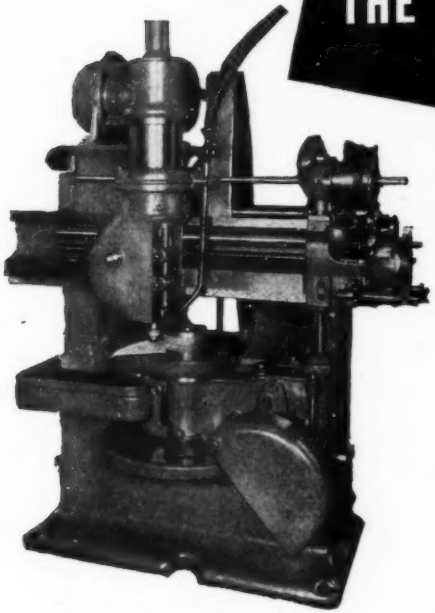
Write for catalog, prices and recommendations

WITTEK
MANUFACTURING CO.
4305-15 West 24th Place, Chicago 23, Ill.

Automatic
ROLL FEEDS
AND
REEL STANDS

Ready for Anything...

THE ONE-MACHINE GEAR SHOP



With versatility beyond comparison, the Fellows 6-Type Gear Shaper will equip you to cut gear teeth or special contours on external work up to 35 inches diameter, and internal work up to 26 inches diameter. Ask for a descriptive circular and renew your acquaintance.

HERE IS A CHECK LIST OF THE MANY JOBS YOU CAN DO ON A FELLOWS 6-TYPE GEAR SHAPER...MOST VERSATILE MACHINE IN THE GEAR SHOP.

- Cut a whole size-range of gears of a given pitch and pressure angle with one cutter.
- Disk an internal or external blank when necessary.
- Cut internal as well as external gear teeth up to 4 diametrical pitch.
- Cut herringbone gears.
- Cut gears to run at "off standard" center distances.
- Cut a keyway, internal or external splines.
- Cut cluster and shoulder gears.
- Cut chain sprockets, ratchet teeth or special shapes.

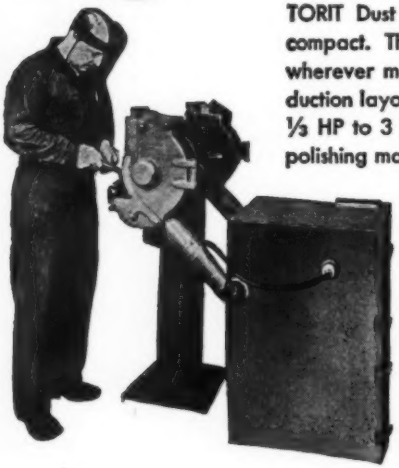
Fellows

THE FELLOWS GEAR SHAPER CO.,

Head Office and Export Dept., Springfield, Vermont, U.S.A. *Branch Offices* ... 616 Fisher Bldg., Detroit 2, or 640 West Town Office Bldg., Chicago 12

Dusty plants miss production figures. Speed output and eliminate danger of abrasive dusts with:

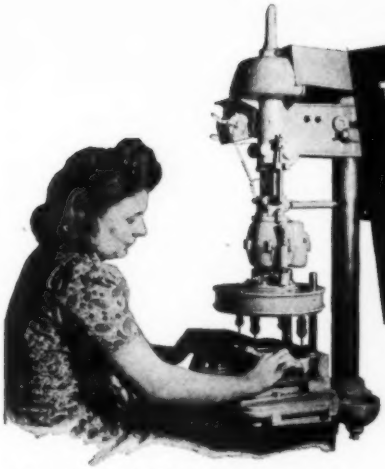
TORIT DUST COLLECTORS



TORIT Dust Collectors are self-contained and compact. The complete unit may be placed wherever most convenient, and moved as production layouts change. They range in size from ⅓ HP to 3 HP and fit all grinding, cutting and polishing machines.

TORIT Dust Collectors are economical. There is no extensive piping and cleaned air is recirculated. For complete information and the latest TORIT catalog; write:

TORIT MANUFACTURING CO.
303 WALNUT ST. • ST. PAUL 2, MINN.



TAPPING PRODUCTION JUMPS 200% WITH Ettco-Emrick MULTIPLE HEADS

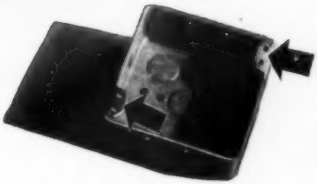


Photo courtesy of Appleton Electric Co., Chicago, Ill.

Here's another example of the big jumps in production that many manufacturers are getting with Ettco-Emrick Multiple Heads in small parts drilling and tapping.

This job is the tapping of the four No. 8-32 holes indicated by the arrows in the electrical outlet box shown above. This was formerly done by the single spindle method at the rate of 500 boxes an hour. Now, as you see in the picture at the left, it is done with an Ettco-Emrick Multiple Tapping Head and Fixture unit mounted on a foot-operated tapping machine—and the girl operator easily turns out 6,000 accurately tapped holes per hour. Production increases, such as this one of 200%, quickly pay back the comparatively low cost of the Multiple Head Units.

FIND OUT WHAT ETTCO-EMRICK MULTIPLE HEADS WILL DO FOR YOU

If you do any small parts drilling or tapping it will pay you to find out about the Ettco-Emrick Multiple Head System.

BULLETIN No. 31 gives full details and many examples. Write for a free copy today.

ETTCO TOOL CO.

596 Johnson Ave., Brooklyn 6, N. Y.

Detroit 1 • **Chicago 6**

Over 25 years specialization in solving industrial drilling and tapping problems

FALCON FOLLOWS THROUGH

GAGES
REAMERS
END MILLS
COUNTER BORES

SPECIAL TOOLS
MILLING CUTTERS
FORM
RELIEVED CUTTERS

EXPERT WORKMANSHIP—UNIFORM QUALITY

FALCON TOOL CO.

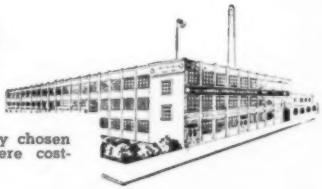
12502 GREINER • DETROIT 5 • MICHIGAN

WIRE FOR DETAILS AND DELIVERY DATA—
WE'LL GIVE YOU QUICK ACTION!

in 1897

. . . a practical idea conceived by Col. John A. Smith, brilliant American inventor, internationally known engineer, practical mechanic.

in 1947



. . . indispensable and internationally chosen for production or maintenance where cost-savings are imperative.

UNITED STATES ELECTRICAL TOOLS

The evolution of electrically operated tools . . . portable bench and floor models . . . is linked with the growth of this company which has become so intertwined with American industry in all phases. And . . . UNITED STATES ELECTRICAL TOOLS are their own "living proof" of what constant improvement has wrought.

CONTACT YOUR DISTRIBUTOR . . .
ASK HIM FOR DETAILS AND PRICES

Portable Electric Drills, Grinders, Surfacers, Polishers, Sanders, Tappers, Saws, Hole Saws, Bench and Floor Grinders, Buffers, Polishers, Flexible Shaft Machines, Valve Seat Grinders, Valve Refinishing Shops and many other tools.

UTILITY FLOOR GRINDER MODEL 500 BALL BEARING 12, 14 and 18" WHEELS

Totally enclosed motor; push button starter for overload protection, ball bearings enclosed in dust-tight housings, enclosed adjustable wheel guards.

The UNITED STATES ELECTRICAL TOOL Co.
CINCINNATI, OHIO

Use DIEHL TURRET LATHES for those Production Jobs

YOU can't beat Diehl for smooth accurate cutting to rigid specifications . . . just the lathe for those "production" jobs. In addition to its high speed precision performance, it works right alongside other No. 2 lathes of standard make —using same tooling, including collets. Write today for complete specification folder and details.

Automatic chuck capacity (round) .....1"	Swing-over Bed .....14"
Swing-over cross Slide.....6"	6 speeds.....forward and reverse
	6 feeds.....to turret slide

The G. M. DIEHL MACHINE WORKS, INC

WABASH, INDIANA, U. S. A.

Featured In This Issue

MACHINING MAGNESIUM. Because of its light weight, fine physical properties and its excellent machining characteristics magnesium is being used in ever increasing quantities. In this article the fundamentals of machining magnesium are stressed. Milling operations, drilling, turning and boring, sawing and planing and shaping magnesium are discussed. Drawings and charts indicate the proper cutting tools to be used with the various machining operations. Page.....135

• • •

HOW TO GRIND CARBIDE TOOLS, by H. A. Frommelt, continues the discussion begun in the February issue of MACHINE and TOOL BLUE BOOK. In this installation the grinding of blades with the cutters inserted in this body, and the grinding of blades separately, is described. Page 153

• • •

HOW FORD SALVAGES WASTE. In this interesting article the methods employed at the Ford Motor Company to salvage rubber articles, drills, hammers, grinding wheels, paper and wooden blocks are described. Employees of the Salvage and Repair Departments must be ingenious and possessed of considerable common sense to return much of what at first seems to be waste material to the production line. Page 172

• • •

LONDON LETTER, Robert Hutcheson, Editor of MACHINE SHOP MAGAZINE, London, keeps us abreast of the latest industrial developments in England. The coal crisis comes in for its share of attention this month. Page. 181

• • •

PRECISION MEASUREMENT, by Warren Baker. In this installment Mr. Baker discusses the inspection of the Cylindrical Square, Flats, Straight Edges and Parallels. Methods of procedure and the tools necessary to perform accurate inspection jobs are mentioned. Page. 190

• • •

METAL HEAT TREATING EQUIPMENT, by Gordon Wheeler, discusses the types of heat transfer most commonly used in industry. Several common types of heat treating units: salt bath, semi-muffler and full muffler are described by an authority in the heat treating field. Page 206

SIGNIFICANCE OF CURRENT TRENDS IN PRICES, WAGES AND PRODUCTIVITY, by Ewan lague. Mr. Clague, Commissioner of Labor Statistics, compares the workers' wages today with his wages in 1935-1938. Also mentioned, among other matters, is a discussion of the average output per man-hour in manufacturing. Page 230

• • •

MODERN CENTERLESS GRINDING PRACTICE, by D. E. Lower. In this, the second of four installments on Centerless Grinding, Mr. Lower presents a factual description of the types of machines used and methods of operation, together with an authoritative discussion of work holding, loading, and feeding attachments and blades (angles employed, thickness, etc.). Page 243

• • •

MACHINING SINGLE PIECE. A description of a machining operation by which twelve tons of chips are removed. Page.....261

• • •

DESIGN OF HELICAL COMPRESSION SPRINGS, by Edward J. Rantsch, M. E. Formula and table for measuring the compression of square wire. Page.....263

• • •

WHAT'S NEW IN METALWORKING. Page 270

• • •

SHOP HINTS. Page.....297

• • •

LET'S TALK SHOP. Page.....315

• • •

AVAILABLE LITERATURE. Page.....351

• • •

NEW TECHNICAL BOOKS. Page.....353

• • •

MECHANICS THROUGH THE AGES. Page 360

• • •

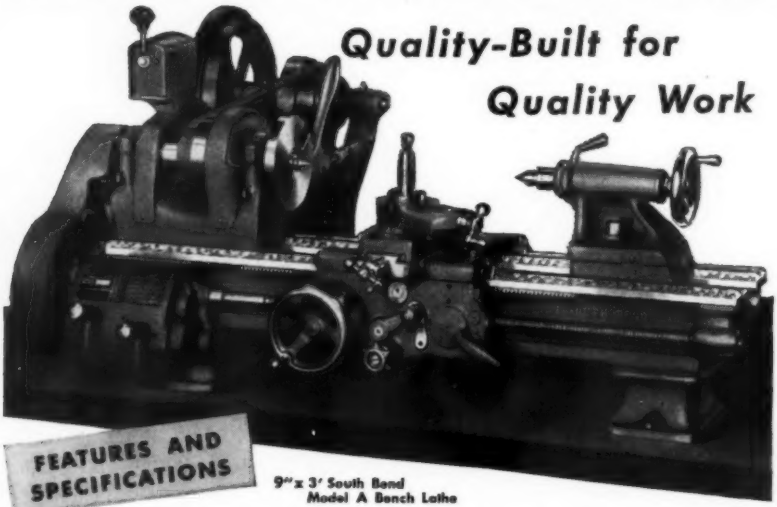
PRODUCTS INDEX. Page.....374

• • •

INDEX TO ADVERTISERS. Page.....382

South Bend 9" Precision Lathes

Quality-Built for Quality Work



9" x 3' South Bend Model A Bench Lathe

FEATURES AND SPECIFICATIONS

SWINGS—9¼" over bed and saddle wings

BED LENGTHS—3, 3½, 4 and 4½ feet

DISTANCE BETWEEN CENTERS—
16 to 34 inches

SPINDLE SPEEDS—
Six—41 to 658 r. p. m.
Twelve—41 to 1270 r. p. m.
Sixteen—46 to 1176 r. p. m.

POWER LONGITUDINAL FEEDS—
Model A Lathes—48, .0015" to .0853"
Model B Lathes—26, .0021" to .0155"
Model C Lathes—14, .0021" to .0156"

POWER CROSS FEEDS—
Model A Lathes—48, .0004" to .0252"
Model B Lathes—23, .001" to .0046"

THREAD CUTTING RANGE—
Model A Lathe—48 pitches, 4 to 224 per inch
Models B and C Lathes—45 pitches, 4 to 160 per inch

MAXIMUM COLLET CAPACITY—½ inch

The quality that is built into South Bend 9" Precision Lathes enables them to produce quality work with efficiency under all conditions. Regardless of the type of machining—between-centers, collet, fixture, or chucking—close tolerances can be maintained and a maximum volume of fine work produced with a minimum of effort.

Write for Catalog 9-J which fully describes and illustrates all South Bend 9" Precision Lathes and attachments.

SPEED PRODUCTION WITH THESE ATTACHMENTS

COLLET ATTACHMENTS	HANDLEVER BED TURRET
TAPER ATTACHMENT	DOUBLE TOOL CROSS SLIDE
MILLING ATTACHMENT	SQUARE TURRET
ELECTRIC GRINDER	CENTER REST
CARRIAGE STOPS	FOLLOWER REST

BUILDING BETTER LATHES SINCE 1906

SOUTH BEND LATHE WORKS

426 EAST MADISON STREET • SOUTH BEND 22, INDIANA

As the Editor . . . . . SEES IT . . . . . .

SOME DARK, SOME BRIGHT NEWS ON PRODUCTIVITY

Several industries report an upward trend in man-hour productivity. At the Square D Company, employees are steadily increasing their efficiency above the 1946 level. The Ford Motor Company announces that productivity is on the up-swing; General Motors Corporation pegs its present productivity at 91% of pre-war, compared to 80% of pre-war last September.

From plants large and small all over the country come similarly encouraging reports.

In contrast to heartening news from some executives, others glumly present discouraging news. The west coast aircraft manufacturers, faced with a curtailment of orders, note an over-all decrease in individual output. This may reflect the workers' desire to hang onto their jobs as long as possible.

A Detroit motor manufacturer is quoted, "We're losing ground daily. At the present rate the workers might as well stay in bed."

The steel industry, generally, is playing close to its vest regarding future plans and is keeping its opinions on productivity behind an iron curtain. One official, however, bluntly terms his man-hour output as "miserable, with no improvement visible."

Whether or not the over-all worker output ratio is above the average 1946 level is questionable in view of the low output ratio — contrasted to pre-war — which existed in all industries during 1946. Certainly, few concerns claim productivity increases over their pre-war levels. Several months must elapse before a national trend in worker output can be definitely established

And yet the productivity picture is pleasanter to look upon than it was during the autumn of 1946. Management optimism, though it is a cautious and a hesitant optimism, is in evidence, with the majority of executives believing the worst is behind and the future clear, if . . . the unions cooperate in raising productivity and holding wages stable . . . the government displays a business-like realism in dealing with taxes, tariffs and trade . . . if prices can be lowered.

William F. Schleicher

Editor-in-Chief

A BUYING GUIDE FOR ABRASIVES

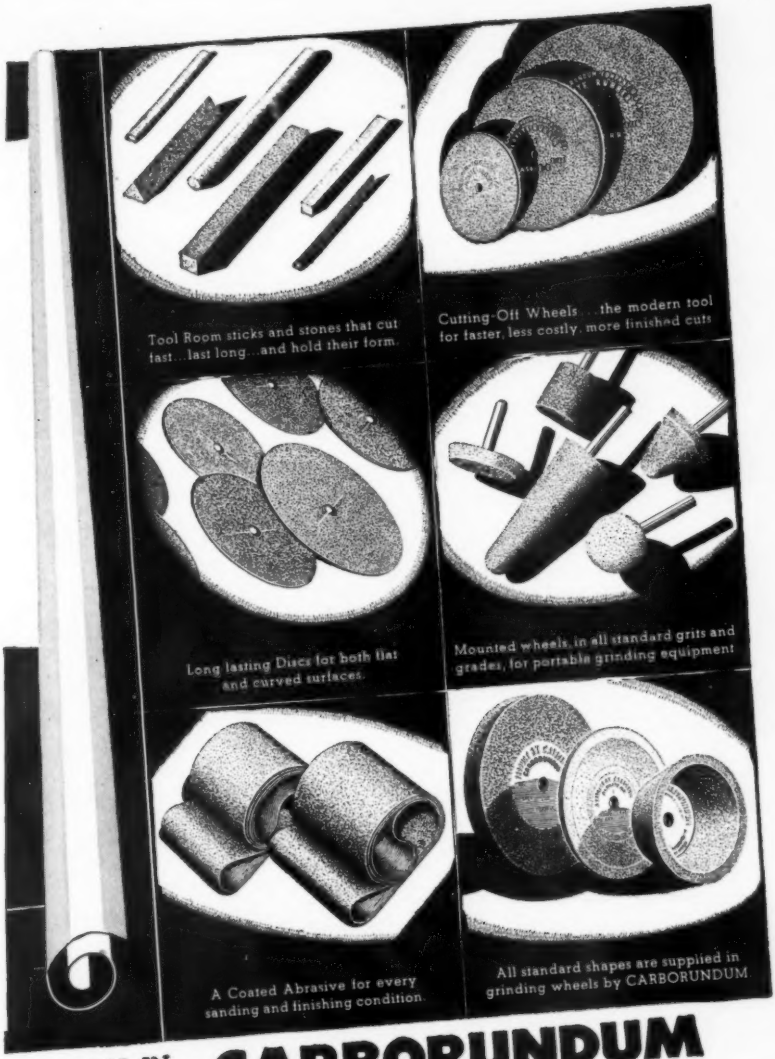
Point No. 2

INFORMATIVE LITERATURE

Being so closely identified with the development and progress of abrasives, it is natural that The Carborundum Company should be the source of so much authoritative literature on their application, care, and handling. Certain highly successful concerns regard the helpful service of technical and engineering literature supplied by The Carborundum Company as a significant point in their preference for abrasives by CARBORUNDUM. Ask your Carborundum representative for literature and bulletins related to your own grinding and finishing operations. The Carborundum Company, Niagara Falls, New York.

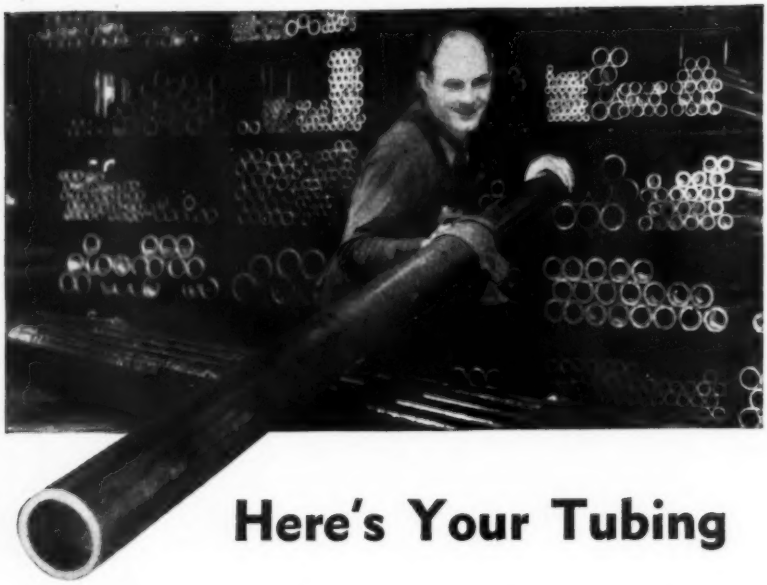
CARBORUNDUM

A Good Rule for Good Grinding


Tool Room sticks and stones that cut fast... last long... and hold their form.
Cutting-Off Wheels... the modern tool for faster, less costly, more finished cuts
Long lasting Discs for both flat and curved surfaces.
Mounted wheels, in all standard grits and grades, for portable grinding equipment
A Coated Abrasive for every sanding and finishing condition.
All standard shapes are supplied in grinding wheels by CARBORUNDUM

... CALL IN **CARBORUNDUM** TRADE MARK

● BONDED ABRASIVES ● COATED ABRASIVES ● ABRASIVE GRAINS AND COMPOUNDS



Here's Your Tubing

Quick Shipment from Large Ryerson Stocks

It's just what you ordered because we continually check the size—accuracy, concentricity and straightness of our tubular stocks.

Its surface is smooth and scale-free because close control over every manufacturing step, from selection of the highest grade billets, through piercing and drawing, to the finished tube, assures a top quality product.

You'll find that constant experimentation to improve machining qualities has paid off in good machinability within the limits of the analysis specified. In short, nothing is overlooked that will help you put this tubing to work as a finished part, quicker and with less waste.

Convenience is another advantage of Ryerson service on tubular products. Large, diversified stocks are on hand for prompt shipment in eleven completely equipped plants . . . providing next-door service most everywhere.

A Ryerson tubing specialist will work with you on all tubular requirements. Get in touch with the plant nearest you when you need tubing from stock.

Joseph T. Ryerson & Son, Inc., Steel-Service Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston, Los Angeles.

IN STOCK

- Low Carbon, Cold Drawn Seamless Mechanical Tubing—Regular & Pump Cylinder Finish
- High Carbon, Cold Drawn Seamless Mechanical Tubing
- Structural Tubing—Hot Rolled, Butt Welded
- Boiler Tubes—Seamless and Electric Resistance Welded
- Allegheny Stainless Seamless Tubing—Type 304
- Allegheny Stainless Seamless and Welded Pipe
- Hot Finished and Cold Drawn Alloy Steel Tubing and Aircraft Quality Tubing Available from Mill Only.

RYERSON STEEL

Machining Magnesium

Introduction

After completion of war orders, many manufacturers, first introduced to magnesium during war years, continued to use magnesium for many peacetime products. In such products where lightness, high strength and economical machining are an issue, magnesium castings find applications in portable tools, vacuum cleaners, polishers, and in printing and textile machinery. Its resistance to shock permits the use of magnesium alloys for aircraft engines and aircraft landing wheels. The combination of strength and light weight and pressure tightness permits the use of magnesium alloy forgings for aircraft engine bearing caps, bearing housings, rocker arm supports, door hinges, cylinder heads, valve and pump bodies, brackets, horn discs and a large variety of other products.

Magnesium alloys possess other important advantages, one of the most important, their excellent machining characteristics.

light weight, desirable physical properties . . . excellent machining characteristics distinguish magnesium and its alloys. Given here are machining recommendations enabling you to obtain maximum machining results. (Textual matter, drawings, photos courtesy the Dow Chemical Company, Midland, Mich.)

General Machining Considerations

Magnesium and its alloys can be machined at extremely high speeds, usually at the maximum obtainable from present equipment. The power required to remove a given amount of metal is much lower than that required for the machining of other metals. See Table 1. From 0.15 to 0.3 hp is needed to remove one cubic inch per minute; thus, due to the lower power required, a heavier cut can be taken. It must be remembered, when machining at high rates of speed, that large quantities of metal are removed in a short period of time, resulting in a proportionately greater power consumption.

The finish produced by machining is smooth; there is no tendency for the metal to tear and drag. It is usually unnecessary to grind magnesium for a smooth finish surface; surface smoothness of three to five micro-inches has been reported for finish turned magnesium. Extremely accurate parts with dimensional tolerances of only a few ten thousandths of an inch can be made by standard machining operations.

• • •

TABLE 1

RELATIVE POWER REQUIRED TO MACHINE METALS

Metal	Relative Power Required (1 = Lowest)
Magnesium Alloys	1.0
Aluminum Alloys	1.8
Brass	2.3
Cast Iron	3.5
Mild Steel	6.3
Nickel Alloys	10.0

In all its forms magnesium is a free cutting metal with machining chips well broken and not obstructing work or cutting tools. Naturally, the type of chip produced is dependent upon the alloy, form and condition of the alloy, and the feed used. Rake angles, cutting speeds, and cutting fluids, which influence chip formations when machining other metals, have little influence on the form of magnesium chips.

Tool Design

A wide latitude in choice of tool angles is made possible by the low temperatures and pressures developed in cutting magnesium; although special attention should be accorded relief and clearance angles. To prevent the tool flanks from rubbing the work and to minimize chip adherence to the tool, relief angles of from 7° to 12° are indicated. Clearance angles should be larger than those normally used for other metals, to provide larger chip spaces. Best tool life and chip formation are obtained if the rake angles are held from 0° to 15°. To prevent chipping, use smaller rake angles with carbide tools than with high speed steels.

A larger volume of chips is produced when machining magnesium and its alloys; hence it is necessary that chip spaces be considerably larger than in those used in tools for other metals. This is especially important in drills, taps, reamers and milling cutters.

High speed cutting tools can be satisfactorily used to machine magnesium and its alloys. For finishing tools, reamers, taps and drills, carbon steels can be employed. However, cemented carbide tools perform well, especially on production jobs. For optimum results, a hard grade of carbide should be used; softer grades of carbides, and those generally used for machining steel, are not satisfactory for cutting magnesium.

Cutting Fluids

The primary purpose of cutting fluids,

PROPERTIES OF CUTTING FLUIDS FOR MACHINING MAGNESIUM

Property	Value
Specific Gravity	0.79 to 0.86
Viscosity (Saybolt) at 100° F.	Up to 55 sec.
Flash Point — Min. Value (Closed Cup)	160° F.
Saponification No. (Max.)	16
Free Acid (Max.)	0.2%

NOTE: Water soluble oils and oil-water emulsions should *not* be used on magnesium because of fire hazard.

TABLE 2

• • •

when machining magnesium, is to cool the work and to reduce the fire hazard. The improvement of surface finish and increased tool life, obtainable when using cutting oils on other metals, are of minor importance when machining magnesium. However, high cutting speeds, high thermal expansion and the low heat capacity of magnesium make it necessary, on some machining operations, that heat be dissipated. The machining of irregular shapes or thin sections, which might easily be distorted, and multi-tool set ups, which create much local heating, are instances where cooling is indicated.

Efficient machining practice demands a high cutting speed; when high speeds are used, however, a fire hazard sometimes exists, especially when fine chips are being produced. Sharp tools greatly reduce this hazard, and while cutting feeds must be in range of 0.001 inch and less to start fires, uncertainties in operations make it mandatory to take precautions against this hazard. A stream of cutting fluid, of four to five gallons per minute per tool, is sufficient to practically eliminate fire hazard. If an operation prohibits the use of cutting fluid, cutting speeds should be reduced to below 500 feet per minute and the recommendations regarding sharp tools and feeds followed. See Table 2.

A wide variety of mineral oil cutting fluids will function satisfactorily and will reduce fire hazard if applied in sufficient quantity; water soluble oils, oil water emulsions or water solutions of any kind, although good coolants, should not be used on magnesium. Water will intensify any chip fires which might accidentally be started and also make reclamation of machine scrap inefficient. Experience has shown that the use of water base cutting fluids on magnesium is dangerous.

Avoid Minor Difficulties

Excessive clamping pressures tend to cause greater springing in magnesium than in the majority of other metals under similar conditions; taking cuts of extreme depths can also contribute to springing of the work. Parts should be chucked so that the clamping pressure is applied to the heavier sections.

Should distortion occur after rough machining, the size of the cut should be decreased and the cutting tools inspected for condition; this usually relieves the trouble, although it may be necessary to stress, relieve or store parts for two or three days prior to finish

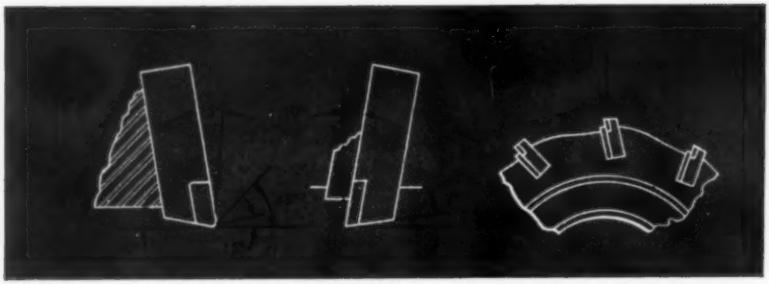


Fig. 1. Typical Inserted Tooth Face Mill Design

• • •

machining. This procedure usually is necessary only on complex parts having extremely close tolerances.

Milling

Slab, side cutting, and straddle mills should be coarse toothed with ½ to 1/3 as many teeth as in mills for steel. To remove the large volume of chips produced when milling magnesium, inserted blade face mills should have large chip spaces. See Fig. 1. Some times negative face rake angles are used in face mills to throw chips out of the cutter. Single and multiple tooth fly cutters perform exceptionally well. Helical slab mills should have a helix angle of approximately 45°. Fig. 2 shows the approximate tool angles for various

• • •

TABLE 3

SPEEDS, FEEDS, AND DEPTHS OF CUT FOR MILLING MAGNESIUM

SPEED fpm	FEED in./min.	FEED in./tooth	DEPTH OF CUT inches
ROUGHING			
Up to 900	10 to 50	0.005 to 0.025	Up to 0.500
900 to 1500	10 to 60	0.005 to 0.020	Up to 0.375
1500 to 3000	15 to 75	0.005 to 0.010	Up to 0.200
FINISHING			
Up to 900	10 to 50	0.005 to 0.015	Up to 0.075
1000 to 3000	10 to 70	0.004 to 0.008	0.005 to 0.050
3000 to 5000	10 to 90	0.003 to 0.006	0.003 to 0.030
5000 to 9000	10 to 120	0.002 to 0.005	0.003 to 0.030

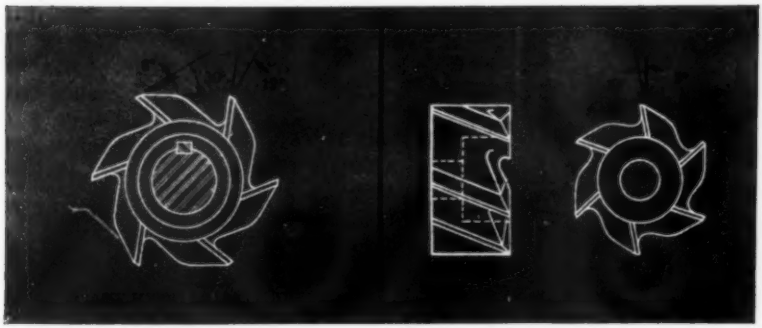


Fig. 2. Typical Milling Cutters

• • •

types of milling cutters.

On milling operations, it is possible to take full advantage of extremely high speeds; cutting speeds up to 9,000 feet per minute are currently used successfully. Because the method of cutting usually does not allow the tool to rub the wood, the high milling speeds do not present a serious fire hazard. See Table 3.

The varieties of feeds and depths of cut which are possible when milling magnesium are determined by the specific job and the amount of metal to be removed. A full depth cut can usually be taken in one pass; for finished cuts the depths should not be less than 0.003 to 0.004".

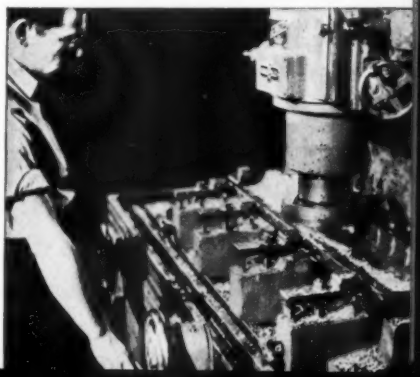
The speed and depth of cut will determine the feed, usually from 0.004 to 0.025" per tooth.

Turning and Boring

With due consideration of the more careful chucking of magnesium and slight differences in tool design, lathe set-ups are similar to those used for brass or steel. Relief angles must be sufficiently large to eliminate rubbing of tool flanks. Rake angles may vary, with best results obtained on high speed tool steels with side and back rake angles of 0 to .15°; use slightly smaller rake angles for carbide-tipped tools, this provides more support for the cutting edge. See Fig. 3.

Forming tools usually have the back rake angle reduced to approximately 0 to 8°, thus reducing chatter. Side and end cutting edge angles may be varied widely to suit the job; although side cutting edge angles above approximately 40° are likely to cause chatter. Keep

• • •



Magnesium alloy aircraft crankcase is being machined in a high speed milling operation. The top surface of the crankcase is being milled with carbide tipped cutters at approximately 3,000 surface feet per minute.

SPEEDS, FEEDS, AND DEPTHS OF CUT FOR TURNING AND BORING MAGNESIUM

OPERATION	Speed fpm	Feed ipm	Maximum Depth of Cut inches
	300 to 600	0.030 to 0.100	0.500
	600 to 1000	0.020 to 0.080	0.400
ROUGHING	1000 to 1500	0.010 to 0.060	0.300
	1500 to 2000	0.010 to 0.040	0.200
	2000 to 5000	0.010 to 0.030	0.150
	300 to 600	0.005 to 0.025	0.100
	600 to 1000	0.005 to 0.020	0.080
FINISHING	1000 to 1500	0.003 to 0.015	0.050
	1500 to 2000	0.003 to 0.015	0.050
	2000 to 5000	0.003 to 0.015	0.050

TABLE 4

• • •

nose radii small to avoid rubbing on end of tool. Depths of cut as high as 0.500" and feeds from 0.003 to 0.200" are being used; naturally, the depth of cut is dependent upon the amount of stock to be removed. Work must be chucked properly. While heavy feeds remove metal quickly, they do not result in best surface finish. For good finish, tool feeds should not exceed 0.025". Avoid extremely fine cuts which tend to beat the work.

Cutting speeds for magnesium vary from approximately 150 to 5000 feet per minute. Usually, the allowable speed exceeds maximum speed of the machine tool. The general rule is to turn and bore magnesium as fast as the machine tool, fixtures, and work will allow. See Table 4.

Shaping and Planing

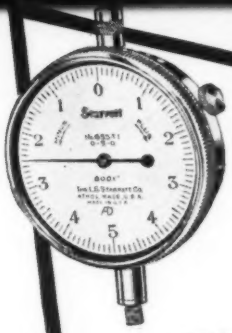
For shaping and planing, use same tool designs and machining recommendations as outlined for turning and boring. Deviations from recommended tool shapes can be made as long as sharp cutting edges and proper relief angles are used.

Cutting fluids are unnecessary in shaping and planing operations because cutting speeds do not create a fire hazard and only a small amount of heat is developed. Limiting factors in size of cut are, rigidity of the work piece, clamping fixtures as well as the possibility of inducing machining stresses.

To prevent marring the surface on finish cuts, the tool block should be lifted on the return stroke of the ram to avoid dragging the tool over the work surface.

Drilling

Three types of drills will effectively service all drilling operations: drills for sheet metal, shallow holes (depth less than five times the drill diameter), and deep holes. Standard steel drills are satisfactory for shallow holes, for maximum production, however, and quality of drilled holes, slight modifications of standard drills are recommended for drilling sheet and deep holes.



FOR ANY
TYPE, SIZE, RANGE, OR
STYLE OF GRADUATION
SEE NEW **STARRETT**
DIAL INDICATOR
CATALOG "B"
THIRD EDITION
WRITE FOR YOUR COPY

Buy Through Your Distributor
THE L. S. STARRETT CO., - ATHOL, - MASSACHUSETTS, - U. S. A.
World's Greatest Toolmakers

STARRETT

PRECISION TOOLS • DIAL INDICATORS • STEEL TAPES • GROUND FLAT STOCK
HACKSAWS • BAND SAWS FOR CUTTING METAL, WOOD, PLASTICS

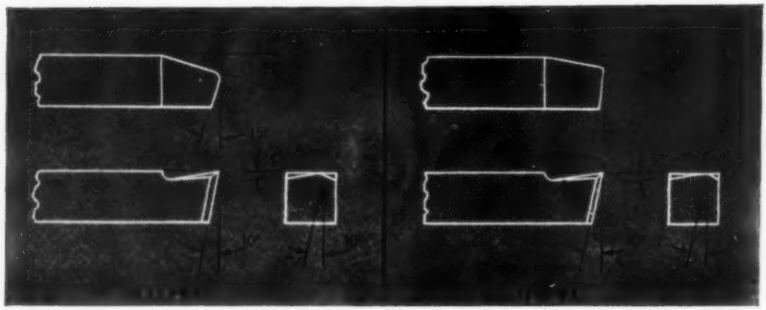


Fig. 3. Typical Turning Tools for Magnesium

• • •

SHEET DRILLING: A standard 118° point angle drill can be used to drill magnesium sheet, but for maximum production and absence of burr, a slightly modified drill is indicated. Reduce point angle to approximately 60° to prevent "walking" of drill, to reduce thrust, and to prevent abrupt change of thrust when breaking thru. Keep chisel edge within range of 120 to 135°. A helix angle of approximately 10° will prevent work from climbing the drill on the break thru. See Fig. 4.

SHALLOW HOLE DRILLING: Only few modifications are necessary to secure maximum production of high quality tools. Standard helix angle of 25° is satisfactory, but may vary from 10 to 30°. Highly polished flutes facilitate flow of chips out of the hole, especially if low helix angles are used. Standard point angles of 118° and chisel edge angles of 120 to 135°, giving a relief angle of approximately 12° will give best cutting action. Point angles may be reduced to as low as 70° and spur joints can be added to eliminate any spiralling in the drilled hole. It is extremely important that the cutting edges be kept sharp. See Fig. 5.

• • •

Fig. 5. Shallow Hole Drill Data

• • •

Fig. 4. Sheet Drill Data

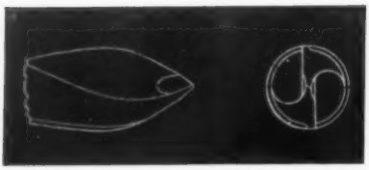
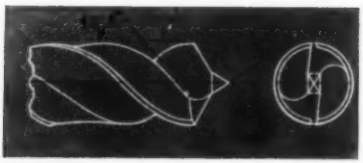
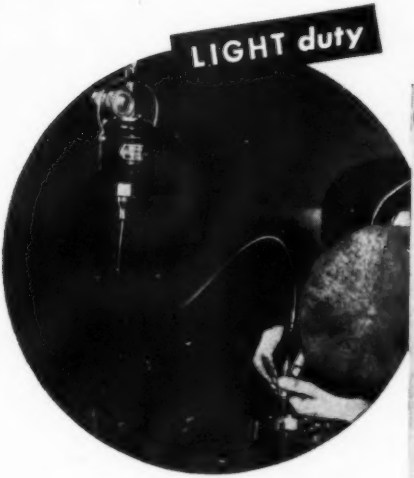
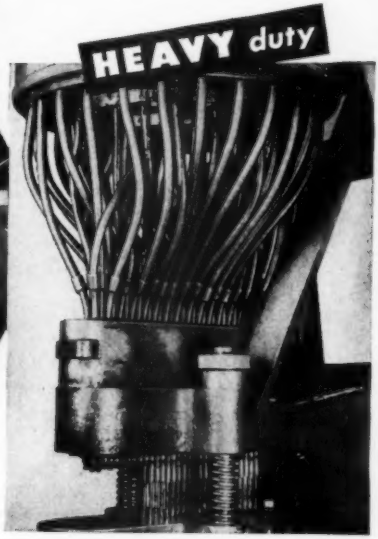


Fig. 6. Deep Hole Drill Data







S.S.WHITE
FLEXIBLE SHAFTS
MAKE IT EASIER TO DO THE JOB

In the small portable tool (left above) the flexible shaft makes possible a small, light handpiece. This means a tool that can be manipulated freely, accurately, and delicately with a minimum of fatigue.

In the heavy duty drill press (right above) the flexible shaft spindles make possible quick changes in set-up for different drilling requirements. They provide positive, reliable drives and give the machine time and cost-saving versatility.

GET THIS FLEXIBLE SHAFT HANDBOOK

Complete information and technical data about flexible shafts and their application are given in this 260-page volume. A copy will be mailed to you free, if you will write for it on your business letterhead and mention your position.

S.S.WHITE INDUSTRIAL DIVISION

THE S. S. WHITE DENTAL MFG. CO. DEPT. H 10 EAST 40th ST., NEW YORK 16, N. Y.

FLEXIBLE SHAFTS • FLEXIBLE SHAFT TOOLS • AIRCRAFT ACCESSORIES
SMALL CUTTING AND GRINDING TOOLS • SPECIAL FORMULA RUBBERS
MOLDED RESISTORS • PLASTIC SPECIALTIES • CONTRACT PLASTICS MOLDING

One of America's AAAA Industrial Enterprises

Automatic drilling, reaming and tapping machine which automatically drills, reams, and taps approximately 80 holes in a magnesium aircraft casting.

• • •

DEEP - HOLE DRILLING: Drilling deep holes in magnesium produces a quantity of chips which must be guided out of the hole thru a considerable length of drill flute. High-helix drills (40 to 45°) will do this satisfactorily. See Fig. 6. Flutes should be opened and polished to provide larger chip spaces and smooth surfaces to aid in chip removal. Low helix angle drills or drills with unopened flutes may cause chips to jam, resulting in high torques and poor surface finish.

Chisel edge angles of 135 to 150° are essential to provide a good surface finish and minimize spiralling in the hole. Angles larger or smaller than those recommended cause difficulties due to improper relief at the cutting edge and lack of proper centering of the drill. A standard drill point of 118° is satisfactory. A spur or pilot point ground at the center of the drill will reduce spiralling or "run-off". Use this spur point drill for all deep hole drilling to insure straight, smooth holes. Of particular importance in the use of multiple spindle or automatic drilling machines is the fact that this type of drill can be used to drill holes up to 25 times the drill diameter without withdrawing the drill to clear the flutes.

A mineral base cutting oil will reduce torque and facilitate the drilling of extremely deep holes.

Drill jig bushings should clear the work by a minimum of 1½ times the drill diameter to reduce the effective depth of holes. Avoid chipping or nicking of drills in the bushing.

SPEEDS AND FEEDS: Speeds up to 2000 feet per minute can be used on magnesium. Feeds should be heavier than those used for other metals in order to secure proper chip formation. Small drills work best with light feeds; heavier feeds should be used on large drills to prevent jamming of the chips. Wide deviations from recommended feeds are allowable when drilling shallow holes, but recommendations for

• • •

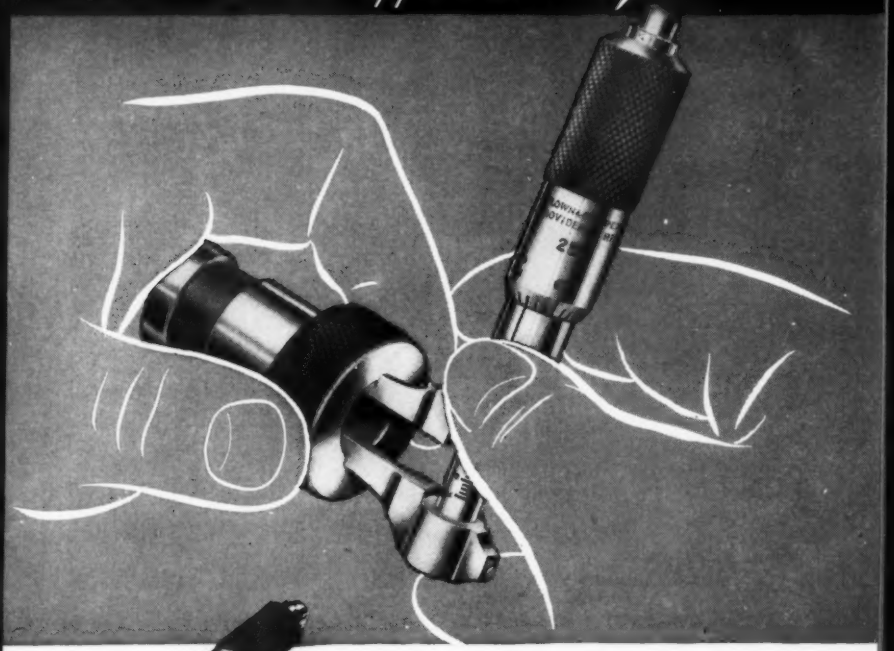
TABLE 5

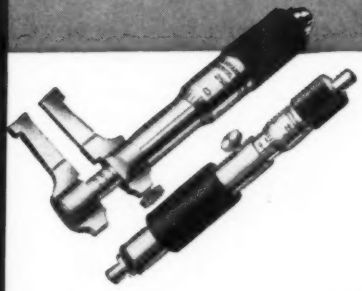
SPEEDS AND FEEDS FOR DRILLING MAGNESIUM

DRILL DIA.	SPEED	FEED—ipr		
in.	fpm	SHEET	SHALLOW HOLES	DEEP HOLES
¼	300	0.005 to 0.030	0.004 to 0.030	0.004 to 0.008
½	to	0.010 to 0.030	0.015 to 0.040	0.012 to 0.020
1	2000	0.010 to 0.030	0.020 to 0.050	0.015 to 0.030

PRIDE OF THE MACHINIST

since apprentice days





Inside Micrometers, Nos. 252 and 270, shown above, are a part of the wide line of Brown & Sharpe Machinists' Tools which include rules, combination squares, bevel protractors, straight edges, vernier tools, dial test indicators and many others.

B·S

We urge buying through the distributor

● **Whether it's the machinist's own micrometer or one issued to him from the tool crib, a Brown & Sharpe tool is an old friend. That's more than familiarity. It is respect for a tradition of fine precision tool making that goes back almost to the beginning of American industry. It is the knowledge of how precisely Brown & Sharpe makes tools . . . of such details as the end-to-end accuracy of the micrometer screw, the easily read graduations and figures and the care that's taken to make accuracy last through the long life of the tool. Such tools have always been the wisest possible tool investment. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.**

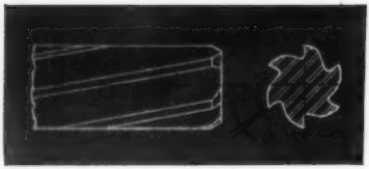


Fig. 7. Reamer for Use on Magnesium

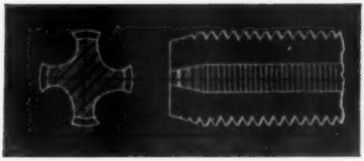


Fig. 8. Typical Tap for Use on Magnesium

• • •

deep hole drilling should be closely followed for best results. See Table 5.

Reaming

For best results, reamers for magnesium alloys should have fewer flutes than normal. Under one inch in diameter reamers should have four flutes; over one inch, six flutes. The flutes may be straight (O° helix angle) or have a negative helix angle of approximately 10°. Margins should be narrow to minimize springing of the metal and obtain accurately sized reamed holes. A wide range of feeds can be used to avoid compressing the metal, a definite cut should be taken. Approximately 1/32" in a diameter should be sufficient stock for reaming holes in magnesium. Heavier cuts may result in chips jamming in the flutes. See Fig. 7.

Tapping and Threading

TAPPING: Threads not held to extremely close tolerances may be tapped with standard taps. High production and the close tolerances necessary for class 3 and 4 threads require taps which are designed for use in magnesium. The taps recommended are the ground high speed steel, straight or helical fluted concentric type. See Fig. 8. Using a heel rake and eliminating radial thread relief provide a cutting action on backing out which prevents jamming of the chips and provides a clear, accurately tapped hole. If a tendency is observed for a tap to cut oversize, the rake angle should be decreased; conversely, in-

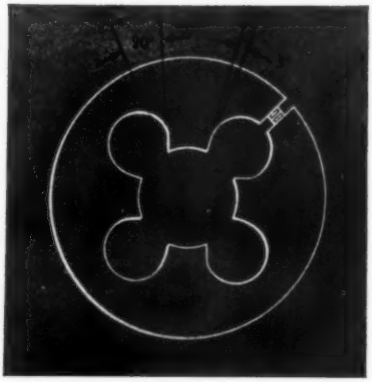
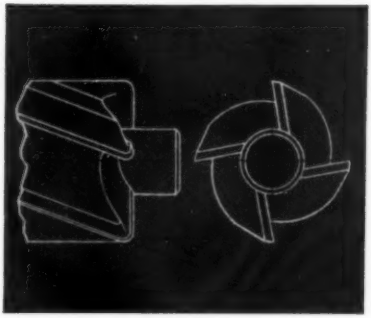


Fig. 9. Typical Threading Die for Use on Magnesium

Fig. 10. Typical Counterbore for Use on Magnesium



A "SMOOTH SHAVE" for soft metals

YES, the Nicholson or Black Diamond Lead Float File actually "shaves" thin slices from such extra-soft metals as lead and babbitt. Its coarse, short-angle teeth or "blades" cut away stock rapidly under normal pressure. Yet the same file—used with a lighter touch—produces a smooth finish.

Lead Float files are made in both Flat (rectangular cross-section) and Half Round shapes.

Nicholson or Black Diamond Lead Float Files —both Flat and Half Round—are widely used by industrial plants and machine shops on soft bearings and moulded parts; and by shipbuilders, plumbers and plumbing manufacturers.

For these—and other special-purpose files—consult your industrial distributor. For special technical information, write to us.

NICHOLSON U.S.A.

NICHOLSON FILE CO., 16 Acorn St., Providence 1, R. I.
(In Canada, Port Hope, Ont.)

NICHOLSON FILES FOR EVERY PURPOSE

Fig. 11. Saws Recommended for Use on Magnesium

• • •

creasing the rake angle will make the tap cut larger.

Use cylindrical lands narrower than normal. Two fluted taps are recommended for holes up to ¼" diameter, three flutes for holes from ½" to approximately ¾" and four flutes for larger holes. Tapping speeds from 75 to 200 feet per minute are recommended.

Standard tapping heads and tapping machines work satisfactorily on magnesium alloys, but experience has shown that machines utilizing a lead screw to establish the pitch of the threads produce more inaccurate threads than any other type of tapping equipment. Errors in lead and floor surface finish are caused by inadvertently forcing the tap, which in the relatively soft magnesium prevents the tap from accurately following its own lead.

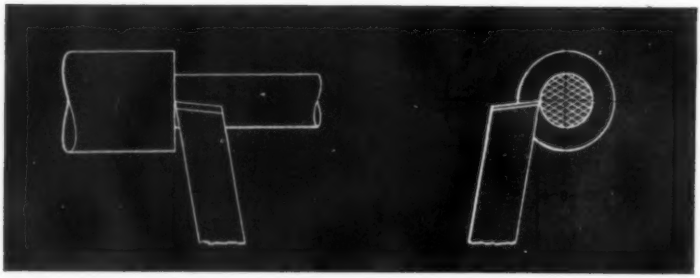
THREADING: The lands should be as narrow as possible to provide adequate chip clearance. See Fig. 9. Threading dies should have approximately the same cutting angle as taps. Self opening dies will result in threads of maximum smoothness. Pay particular attention to the sharpness of the cutting edges and relief. Speeds up to 1000 feet per minute can be used.

Counterboring

Margins should be small with adequate relief and clearance angles to eliminate rubbing and provide adequate chip space. Avoid sharp interior corners which cause stress concentration; for

• • •

Fig. 12. Automatic Screw Machine Box Tools



Whips the TOUGH jobs too!

The severely interrupted cut in facing this crank-shaft requires the steep negative back rake shown.

Firthite sintered carbide tools take the hard jobs as well as the easy jobs in stride—as evidenced by the case history shown above.

Firth Sterling offers a complete metal cutting service on either high speed steel tools (Circle-C or Blue Chip) or sintered carbides (Firthite). Let our trained Cutting Tool Engineers help you to make the right decision on your cutting problems.

THE JOB

PART: Crank forging.
MACHINE: Turret Lathe.
OPERATION: Face crankshaft cheek.
CONDITIONS: 182 RPM (over 300 feet per minute)—at 0.006 FPR.

THE TOOL

FIRTHITE Grade TO4, 1" x 1½" x 3" —35° negative back rake, 18° positive side rake.

RESULTS

9 to 12 pieces per grind as against 3 with former tools.

Call **Firth Sterling**

STEEL & CARBIDE CORPORATION

McKEESPORT, PA. • NEW YORK • HARTFORD • PHILADELPHIA • PITTSBURGH • CLEVELAND • DAYTON • DETROIT • CHICAGO • LOS ANGELES

this reason counterbores should have rounded corners at the ends of the cutting edges. Cover radii of 1/16" or more are recommended, depending on the diameter of the cutter. See Fig. 10.

Sawing

Because of low cutting pressures, larger cuts can be taken per tooth cut than are possible with other metals; for this reason larger chip spaces are indicated to permit the saw to remain free cutting. Too small a tooth pitch or chip space will cause the saw to ride over the work and dull the teeth. The set of the teeth must be relatively large, relief angles on circular saws must be adequate to minimize friction. See Fig. 11.

Sawing feeds are best determined by the requirements of the job and type of sawing machine used. A rough estimate of the allowable feeds may be made, based on the fact that magnesium requires only 1/10 the power that is required for sawing steel. Feeds up to 120 inches per minute can be used with circular saws.

Automatic Screw Machine Work

While the excellent machining characteristics of magnesium permit the use of feeds which average approximately 50 to 75% higher than those used in machining brass, the feeds are limited by the condition of the tool, surface finish desired and size of work piece. Heavy feeds are preferred because they produce well-broken chips. Feeds as low as approximately 0.015" will produce short coils; below this limit the chips are likely to consist of long ribbons or coils.

A cutting fluid is recommended for screw machine work; this controls thermal expansion. On simple work at low cutting speeds it may be possible to eliminate the cutting fluid. Tools should not be allowed to rub on the work.

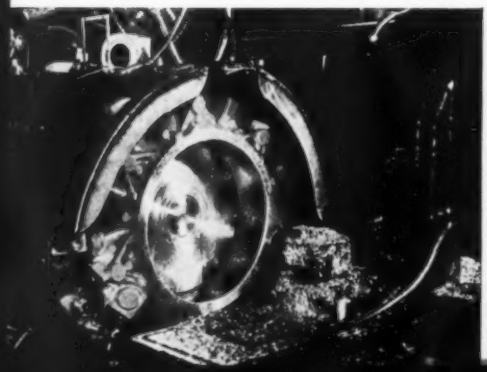
Screw machine tools for cutting magnesium require little change from standard tools such as would be used for brass. Attention must be paid to relief and clearance angles and chip spaces.

BOX TOOLS: No special features are necessary on this type tool. Chip breakers are not required. The feeds are merely set higher and produce shorter chips. See Fig. 12.

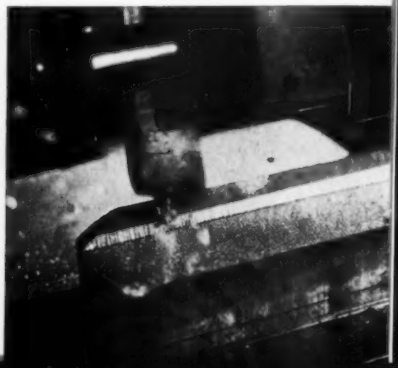
FORM TOOLS: Rake angles from 0 to 10° are satisfactory, with the 0° rake giving better chip breakage. Relief angles should have a minimum value

• • •

A large aircraft supercharger part is chucked in an automatic lathe. Approximately seven operations are performed on this part.



Close-up view of the shaper taking approximately a ½" deep cut in magnesium with very heavy feeds. This illustrates the heavy cuts which can be taken in magnesium on standard machine tools.



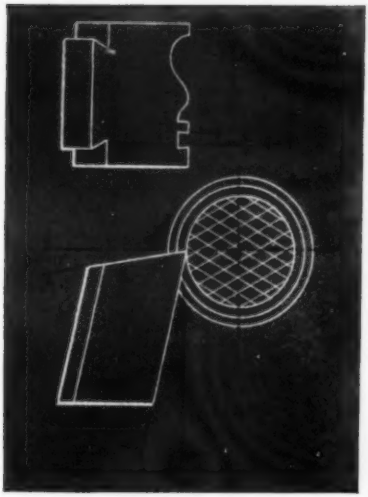


Fig. 13. Automatic Screw Machine Form Tool

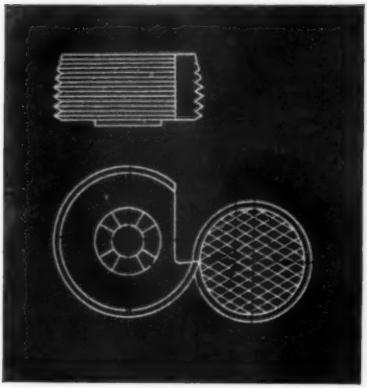
• • •

of 8°. It may be desirable to use a side relief of approximately 1° to minimize rubbing of tool on the work. The ratio of maximum width of cut to the diameter of the work is approximately two for magnesium. See Fig. 13.

TAPS AND DIES: Taps, solid dies and thread chasers for use on automatic screw machines should be similar to those described in the section on tapping and threading. See Fig. 14.

• • •

Fig. 14. Automatic Screw Machine Thread Chaser

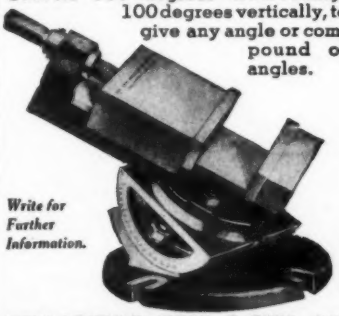


New Britain

UNIVERSAL VISE

THE ORIGINAL

Swivels 360 degrees horizontally, 100 degrees vertically, to give any angle or compound of angles.



Write for Further Information.

NEW BRITAIN TOOL & MFG. CO.

NEW BRITAIN, CONN., U. S. A.

BURR KEYSEATERS

Mill keyways in the run or on the ends of shafting already erected — save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

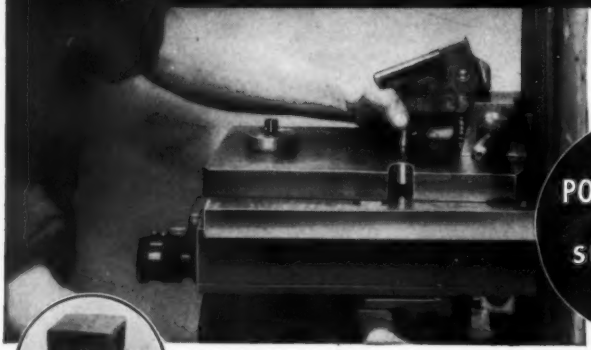
Write for Bulletins and prices.

JOHN T. BURR & SON

429 Kent Ave., Brooklyn, N. Y.

FIVE TIMES FASTER !

ON THIS PRECISION MACHINING JOB



PORTER-CABLE
Wet Belt
SURFACER
BG-8

The material is a tough bronze alloy. The job, to generate a radius 9.845" with tolerance of plus or minus .002". On a high-priced milling machine, operated by a skilled man and equipped with a costly fixture, estimated production would be four pieces per hour. With a Porter-Cable Wet-Belt Surfacer, using a simple fixture on the feed table, a semi-skilled operator produces better than one piece every three minutes... ***FIVE TIMES FASTER!***

SUCH close-tolerance machining is but one of the jobs which proves the speed, precision and economy of the PORTER-CABLE WET BELT SURFACER. For cleaning up; reducing stock; squaring; grinding radii, flats or chamfers; removing burrs, this production machine also does time-saving work—either *freehand*, or with the simplest of fixtures. The PORTER-CABLE Wet Belt method reduces heat, permits rapid stock removal and assures flawless finishes on all types of metals and plastics. Write for fully illustrated proof of the superiority of the PORTER-CABLE method, showing scores of operations that will suggest cost-cutting applications in your plant.

PORTER-CABLE MACHINE CO.

300-3 EXCHANGE ST. SYRACUSE 8, NEW YORK

How To Grind Carbide Tools

by

H. A. Frommelt

Part 2. Grinding Milling Cutters

In this, the final part of How To Grind Carbide Tools, the author describes the methods used to grind milling cutters. The grinding of blades with the cutters inserted in the body, and the grinding of blades separately, will be described.

Before discussing the grinding of multi-tooth carbide cutters, it might be advisable to briefly summarize the recommendations made for the grinding of single point carbides, which was discussed in the January issue of the MACHINE AND TOOL BLUE BOOK.

1. Infeed with silicon carbide wheels should be at least .001" to .002" per pass. This is necessary to break down the wheel and present new grains to the carbide.

2. Use 180 to 200 grit ceramic vitrified or resinoid bond diamond wheels. Where diamond wheels are used even for the grinding of single point tools this observation should be followed.

3. Use wheels of 100 concentration (diamond) for both roughing and finishing.

4. Use 1/16" to ⅛" maximum face width in the diamond wheel in machine or fixed grinding.

5. Operate the diamond wheel at 5000 to 6000 surface feet per minute. This will result in the most efficient cutting action.

6. Use a coolant to prevent loading of the wheel.

7. Kerosene applied by wick or water with solvent such as sal soda prevents loading of diamond wheel.

8. Infeed from .0002" to .0005" maximum traverse feed from 40 to 60 passes per minute. The wheel should never be permitted to dwell on the work, this results in crazing.

9. Diamond wheels should be mounted to within .005" runout.

10. Diamond wheels with ⅛" depth of diamond are economical.

11. To remove minutely rough edges blades should be diamond honed with a diamond of 220 or 320 grit; thus increasing tool life by as much as 30 percent.

12. Wheel rotation should be downward against the cutting edge of the blade; this should be observed for both silicon carbide and diamond wheels.

Grinding Milling Cutters

The grinding of milling cutters must be considered under two headings; namely, the grinding of the cutter with the blades inserted in the body, and the grinding of blades separately much as a single point tool. The former requires a grinder usually specially designed for the grinding of cutter bodies while the latter is accomplished with a grinding jig and a small surface grinder. Both these methods will be con-

sidered in detail step by step.

Grinding Wheels

Since cutters or blades are ground with a fixed relation between the wheel and the blades this grinding requires a diamond wheel. And this requirement holds whether the carbide is of the steel cutting grade or for the less hard materials including cast iron.

A diamond wheel of 220 grit and ⅛ depth with 100 concentration is considered quite satisfactory for both roughing and finishing. If the grinding is to be done in 2 steps namely roughing and finishing, the former can be performed with 100 grit wheel and the latter with a grit in the neighborhood of 200. Resinoid or modified vitrified ceramic bond is recommended for the grinding of milling cutters or blades. Metallic bonded wheels are not as successfully applied to this grinding operation. Something less hard than the latter, which permits the diamond particles to turn when dulled and thus present new cutting edges to the carbide, has proven more effective for these grinding operations, particularly as regards diamond wheel life.

Generally speaking, a peripheral wheel is preferred to a face or cup wheel; thus a line contact rather than a surface contact is made between the diamond wheel and the carbide tip or blade.

All grinding operations for the reconditioning of milling cutters and blades should be performed wet. A reservoir with kerosene feeding this solvent to a wick to the wheel prevents loading and makes possible a freer cutting. Thus lubricated, the life of a diamond wheel is increased many fold as compared with dry grinding; in addition, damage to the carbide tip or blade is reduced to a minimum with wet grinding. A loaded wheel increases the friction and thereby the localized heating effect which may easily result in hair line cracks.

It is essential that not more than ½ thousandth, and preferably less, of carbide be removed at a pass; heavier cuts than this increase the likelihood of damage to the carbide through excessive heating. Recommended speeds for diamond wheels, and surface feet per minute, is standard at 5,000 to 6,000.

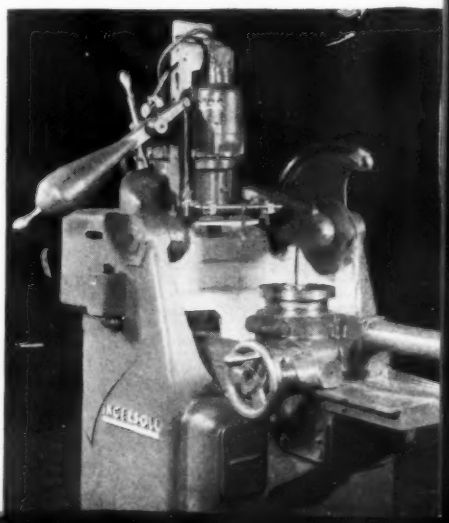
Diamond wheels used for the reconditioning of milling cutter tips and blades should be dressed at regular intervals with so-called dressing sticks, usually of crystolon, as provided by abrasive manufacturers. The frequency with which this dressing is done depends upon the amount of carbide removed. Generally speaking, when a diamond wheel is in constant use it should be dressed several times each hour; an experienced operator can determine when dressing is necessary by the feel of the cutting action of the wheel. When this is no longer "free" the wheel is beginning to load.

Grinding Machine for Milling Cutters

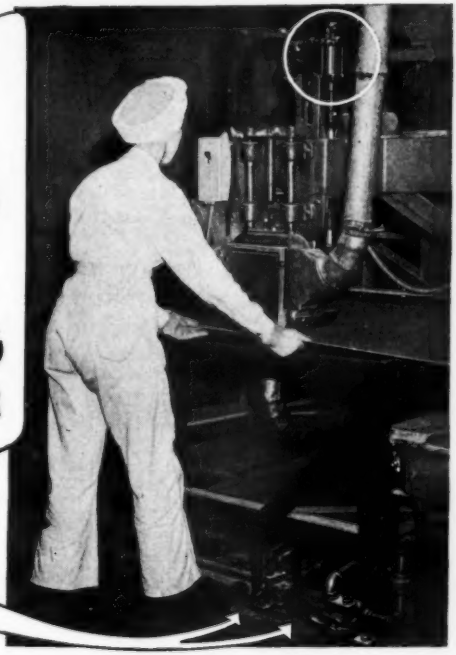
Various types of milling cutter grind-

• • •

Fig. 1. A cutter grinder restricted to the grinding of facemills.



FOOT-CONTROL *Speeds* DEFECT-CUTTING in Veneer Plant



Cutting out surface defects in veneer panels is simplified and accelerated by the use of NOPAK equipment at Pacific Veneer Co., New Westminster, B.C. Here a NOPAK Model E Air Cylinder actuates vertical movement of the veneer cutter. The cylinder is controlled by a NOPAK Model R Foot Valve, leaving the operator's hands free to position the panels quickly and accurately . . . greatly increasing cutting capacity. The other foot valve shown is a NOPAK Model RN, with neutral holding position, which controls a cylinder on an adjacent machine.

GALLAND-HENNING MFG. CO., 2754 S. 31st ST., Milwaukee 7, Wis.

Production Men . . .
This application of NOPAK Valves and Cylinders may suggest how the operating cycles of certain machines in your plant can be speeded up and manual effort decreased.

NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE

ers are available to industry. They will be considered as forming two separate classes for the purposes of this exposition. Since milling cutter designs now include a precision body using solid carbide blades that can be ground in a grinding block or jig it is necessary to include the use of a surface grinder, preferably specially designed for this purpose, in addition to so-called cutter grinders.

A cutter grinder restricted to the grinding of facemills is shown in Fig. 1.

Fig. 2 presents a specially designed surface grinder used to grind solid carbide blades that will, after re-conditioning, be assembled in the tool holder or cutter body. The use of both types, namely the cutter grinder and the surface grinder will be explained.

Using a Cutter Grinder

When grinding a brazed tip facemill, mounted in a cutter grinder for re-conditioning, it is essential that in this preliminary stage the cutter bore and the cutter grinder arbor be carefully cleaned. Otherwise inaccuracies will be ground into the cutting tips. Moreover the bore and the arbor surfaces should be free from nicks and imperfections which will also result in an inaccurate grinding job.

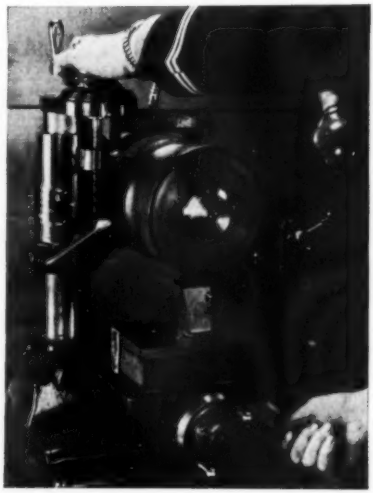
Step No. 1

The first operation in the grinding of the tips of a facemill consist in removing the wear on the OD or the periphery of the tips. This is accomplished by preventing cutter rotation, and presenting the diamond wheel to the blade so that the direction of rotation is downward and away from the cutting edge; thus break-out of the cutting edge in grinding is prevented. Each blade is thus ground feeding the

• • •

East Shore Announces
purchase of manufacturing and sales rights of the State Boring and Reaming Tool and allied products. These tools are now being produced in the East Shore Factory, well known for years of manufacture of precision automotive parts, the Glenny Broach, etc.
The GLENNY PUSH BROACH
Broaches keyways accurate to ±.0005, either quantity production or small lots at a new low cost.
The STATE BORING & REAMING TOOL
Patented, multiple, interlocking cutters that bore and ream at the same operation. Higher speeds, greater feeds than single point or double end cutters.
The STATE CORE DRILL
The modern replacement tool for fixed center drills—greatly reducing cost per hole.
The DIALSET BORING TOOL
A single cutter boring bar which adjusts to positive accuracy through micrometer adjustment.
The EAST SHORE PUMP
A positive displacement unit for liquids having lubricating properties, water, coolants, chemicals, gasoline, hydraulics, etc.
The VELSEY Black Granite SURFACE PLATE
Olivine Diabase, a superior form of black granite, which produces in the Velsey, the most accurate commercially produced surface plate.
SEND FOR PARTICULARS
EAST SHORE MACHINE PRODUCTS CO.
CLEVELAND 10, OHIO

Fig. 2. A specially designed surface grinder used to grind solid carbide blades.



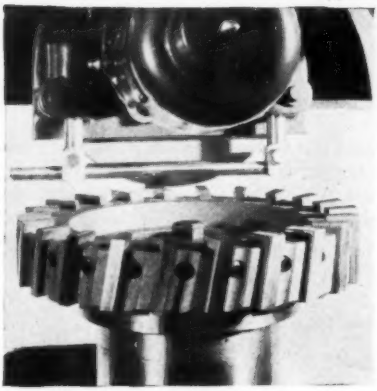


Fig. 3. Grinding the tips of a facemill involves first the removal of wear on the O D or the periphery of the tips.

• • •

diamond wheel not more than ½ a thousandth while grinding each blade; this is continued around the periphery of the cutter until a maximum wear on any blade had been removed.

In this first step a silicon carbide wheel is used. See Fig. 3. The primary clearance which provides the necessary relief in the steel shank (or cutter body) is ground. The clearance angles commonly used for these cutters is shown in the table Fig. 4. For this purpose the head on which the cutter is mounted in the cutter grinder is tilted an amount equal to the secondary clearance angle desired.

Step No. 2

With the silicon carbide wheel mounted on the arbor of the cutter grinder the necessary clearance angle on the face is now ground. Since these 2 operations in steps 1 and 2 involve the removal of steel from the shank to the extent that this is necessary for a

the new.....
CARDINAL NO. 18
SLO-DRIVE
•DOUBLES
•DRILL PRESS
•CAPACITY

•$250.00 up

THE NEW CARDINAL NO. 18 "SLO-DRIVE" REDUCES SPINDLE SPEEDS OF POPULAR 18" TO 20" DRILL PRESSES TO A RANGE ACCOMMODATING DRILLS AND OTHER TOOLS UP TO 1" DIAMETER OR LARGER. UNIT RUGGEDLY CONSTRUCTED, INTERCHANGEABLE, EASILY INSTALLED. COMPLETE SPECIFICATIONS UPON REQUEST.

CARDINAL MACHINE COMPANY
GLENDALE, CALIFORNIA
"THE -SPEED-VISE- MANUFACTURER"

clearance angle, a silicon carbide wheel is used for these operations. The head on which the cutter is mounted is so designed with tapered bases to permit setting at any desired angle both in the horizontal and vertical plane.

Step No. 3

The silicon carbide wheel is now replaced with a suitable diamond wheel, which is permanently mounted on a tapered arbor and which has been corrected for a run-out. The head is now set for the proper primary clearance angle which can be ground into the carbide tip or blade on the OD. This again is accomplished in a manner very similar to the operation called for in the grinding of the secondary clearance angle on tht OD. Here however, the diamond wheel comes into contact only

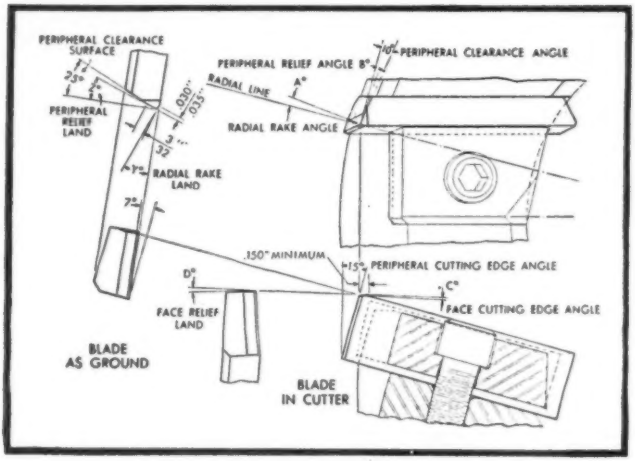
• • •

Fig. 4. Clearance angles commonly used for various materials.

TABLE I—Recommended Grades and Cutting Angles

Material to be Milled	Grade *	Angles (See Diagram below)					
		Cutting				Blade Grinding	
		A	B	C	D	Y	Z
Steel	KM, K2S	— 7°	5°	0°—10′	5°	21°—40′	20°
Cast Iron	K6	+10°	7°	0°—10′	7°	4°—40′	22°
Brass and Bronze	K6	+10°	7°	0°—10′	7°	4°—40′	22°
Light Alloys	K6	+15°	7°	0°—10′	15°	0°	22°

*Other grades available upon order.



"TOPS" in the Rotary File Field

THEY'RE "TOPS" in every respect . . . quality . . . performance . . . long service. That's why Nicholson Rotary Files and Burs are largely preferred by experienced industrial craftsmen. For throughout their wide range of types, cuts and sizes, Nicholson Rotaries are manufactured with precision—perfectly rounded, true centered, accurately cut or ground, expertly hardened.

For delicate filing operations, Nicholson now offers Rotary Files (hand cut) and Burs (ground from solid) with 1/8" shanks. Available in 9 standard shapes, one degree of coarseness, stock diameters from 1/8" to 5/8".

For general-purpose filing, there are 1/4" shank Nicholson Hand Cut Rotary Files and Ground Burs. 16 standard shapes. 3 cuts—Coarse, Medium, Fine. 1/8" to 1 1/8" stock diameters.

For long production runs, there are Nicholson Cemented Carbide Burs – with wearing qualities up to a hundred times that of high-speed tool steel. 1/4" shanks. 9 standard shapes. 1/4" to 1" stock diameters.

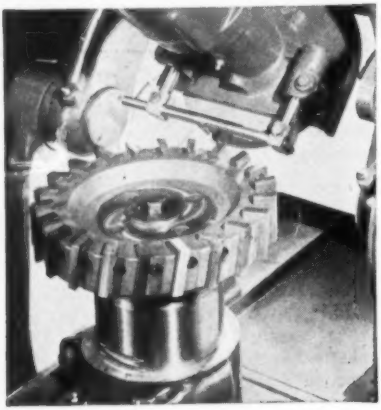
Write for any desired further information. Also consult your industrial distributor. He will not only fill your needs, but will render helpful assistance on selections.

NICHOLSON FILE CO., 91 ACORN ST.
PROVIDENCE 1, R. I.
(In Canada, Port Hope, Ont.)

NICHOLSON ROTARY FILES
HAND CUT OR GROUND • FOR EVERY PURPOSE

NICHOLSON U.S.A.

Fig. 5. The head is set for the proper primary clearance angle which can be ground into the carbide tip or blade on the O D.



with carbide. Each blade or tip is ground removing approximately a ½ a thousandth or less. This is continued on each blade or tip in turn until the length of the primary clearance measured from the cutting edge is .030 to .050 long. The set-up for this operation is shown in Fig. 5.

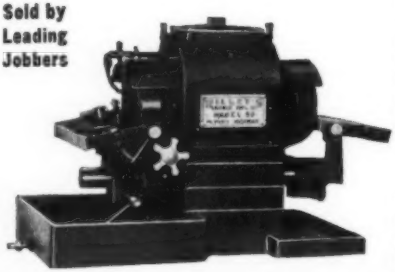
Step No. 4

With the diamond wheel properly trued on its own arbor, as previously stated, the head on which the cutter body is mounted is now swivelled to bring the face cutting angle into proper relationship with the diamond wheel; moreover the head is tilted so that the proper clearance angle and dish angle will be ground into this portion of the carbide blade. (Refer to Fig. 4 for the table showing the proper clearance angles).

The face clearance angle (and the dish angle) are now ground into each

WILLEY'S BENCH TYPE GRINDER

Sold by Leading Jobbers



Willey's Model 50 is compact, designed for fast, economical wet or dry grinding of tungsten carbide tools, as well as other types of tool bits up to a maximum of 1¼" square or equal cross sectional area. Precision built, for accurate work. Pedestal base available.

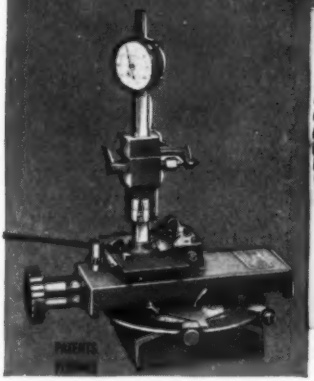
WRITE FOR CATALOGS
(Use business letterhead, please)

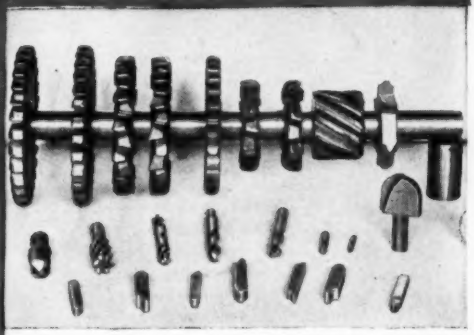
No. 29. Standard and special tools, gages, etc.

No. 42. Diamond tools, diamond and mechanical wheel dressers.

WILLEY'S CARBIDE TOOL CO.
SOLE MAKERS OF WILLEY'S METAL
1342 W. Vernor Highway Detroit 1, Michigan

Is Your Tool Room a Bottleneck for Those Badly Needed Production Tools?





Here are a few standard cutting tools that have been ground on the radiform into special forms.

If your production is being delayed in your tool room, it will pay you to investigate the Rad Wheel and Tool Former for simplifying your difficult tool grinding jobs. Radiform will save you time, money, and give you precision results you had never before hoped for.

With a Diamond Wheel, carbide tools are no more difficult to grind than high speed steel tools.

Write or wire for literature and prices today.

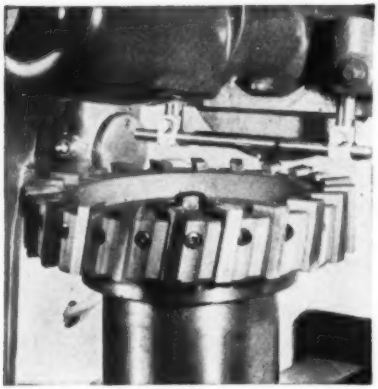
A number of good territories are open to qualified distributors.

Manufacturers also of Meyco Carbide Drill Jig Bushings.

W. F. MEYERS COMPANY • ESTABLISHED 1888

1013 FOURTEENTH STREET • • • BEDFORD, INDIANA

Fig. 6. The face clearance angle (and the dish angle) are ground into each blade.



blade in the manner previously described. That is, approximately .0005" of carbide (preferably less) is removed at a single pass on each blade. The cutter body is then rotated to the next blade and the operation repeated. This is continued until the face clearance angle has been properly ground into the blade. See Fig. 6.

Step No. 5

In this step the proper cutting angles are ground into the carbide tip or blade. Fig. 4 presents a table of cutting angles such as are commonly used for the various materials, viz: steel, cast iron, their alloys and the non-ferrous materials including plastics. These cutting angles are varied according to the production techniques used; however there is every reason to believe that these cutting angles are not critical. Rather, the clearance angles, previously discussed, are far more important. The tips or

As Every Machinist Knows —
IT PAYS to REDUCE TAP BREAKAGE

Does the job in a fraction of the time required for hand tapping. Because the work is dependably straight and square, tap breakage is practically eliminated — and gone are the wasted hours of trying to pry broken taps out of dies. Equipped with seven Adaptors, ranging from 8-32 to ½", it takes care of 95% of all tapping requirements. (Taps not furnished). $52.50 F.O.B. Minneapolis. Ask your mill supply house, or write Dahlstrom Mfg. Co., 416 South 6th St., Minneapolis 15, Minnesota.

Dahlstrom **TAP GUIDE**

- 12" x 6" x 14"
- Fastens to wall or bench
- Anyone can operate it

NEW ELECTRODE SIMPLIFIES TOUGH-TO-WELD JOBS

"SHIELD-ARC LH-70" is a new heavily coated electrode designed primarily for the welding of steels of poor weldability. Its as-welded properties are 75,000 to 80,000 lbs. per sq. inch and 25% to 30% elongation in 2". Stress relieved tensile strength is 70,000 lbs. per sq. in. minimum. Normally it produces a convex bead.

TYPICAL APPLICATIONS. Experience to date shows that this electrode produces exceptional results in these applications:

Low alloy high tensile steels which cannot be preheated.
High sulphur (free machining) steels.
High carbon, medium carbon steels.
High silicon electrical sheet steel.
For welds to be porcelain-enameled without annealing.

PROCEDURE. Use DC—electrode positive, work negative.

Hold a short arc. 1/8" and 5/32" may be used for vertical and overhead positions, single or multiple pass. Make vertical welds from bottom upward. Make overhead welds with stringer beads or narrow lateral weave.

For further details, call the Lincoln Welding Engineer nearby or write THE LINCOLN ELECTRIC CO., Dept. 311, Cleveland 1, Ohio.

Butt welding medium carbon (.50% C) steel sprocket teeth forgings with the new Lincoln "Shield-Arc LH-70" Electrode

blades are ground according to the fundamentally correct technique referred to previously, that is, a light depth of cut, rapidly taken and using a coolant—these are fundamental to all good carbide grinding.

Step No. 6

In the next operation the corner angle, either specified in the workpiece or determined by the technique, is finally ground. If no corner angle is specified on the drawing it is common to use either a 15 degree, 30 degree or 45 degree. Some techniques call for a corner angle as large as 75 degrees. See Fig. 7.

Step No. 7

In this final operation it is considered necessary and even essential that the cutting edge corner of each blade or tip be "broken"; interpreted properly this means that the corner should be

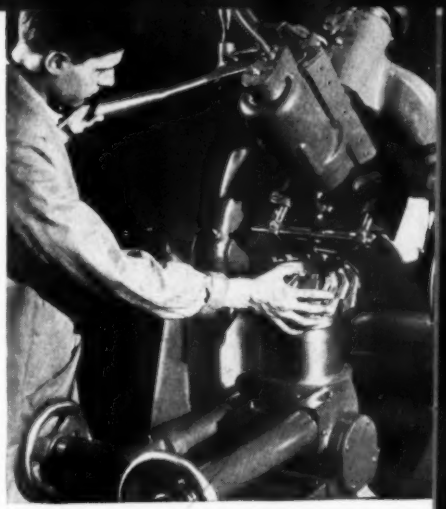


Fig. 7. The corner angle, either specified in the workpiece or determined by the technique, is finally ground.

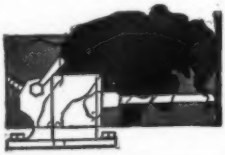
• • •

Cut Costs with

MEAD

MIDGET AIR CLAMPS

Horizontal and Vertical!



Both models deliver 80 lbs. pressure on a line pressure of 100 lbs. They'll save countless man-hours in assembly operations involving welding, riveting, bolting, etc. *Advantages over mechanical clamps:* 1. Any number can be operated by single master valve. 2. Easily installed in cramped corners. 3. Equal ram pressure at any stroke point. Send for new Mead AIR POWER Catalog, describing our line of Air Clamps, Air Vises, Air Presses, Work Feeders, Valves, Controls, etc.

MEAD SPECIALTIES COMPANY

4114 N. KNOX AVE. DEPT. YA-37 CHICAGO 41, ILL.

PRODUCTION JUMPS...

When You Equip Your Lathes with

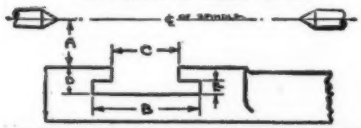
Enco MULTIPLE TOOL HOLDERS

Model 6-S

Save 50% on tool change time. Enco turret tool posts index instantly to any one of 12 positions. Set up complete jobs at one time . . . and avoid time-wasting delays for set-ups on second operations. On center at all times—your most frequently used tools (Facing, turning, threading, etc.) remain in the turret—ready to help you cut lathe time. The Enco Turret mounts rectangular and square tools and standard boring bars and cut-off blades.

"A" dimension range (From diagram on this page)	MODEL 6-S 2" to 3⅛" incl.*	MODEL 4½-S 1⅛" to 2½" incl.*	MODEL 3½-S 1⅛" to 1¾" incl.	MODEL 2½-S ⅞" to 1⅝" incl.	MODEL H ⅞" to 1⅝" incl.
LATHE SWING	11" to 20" SWING	13" to 16" SWING	10" to 13" SWING & BENCH LATHES	BENCH LATHES	BENCH LATHES
TOOL SIZE RANGE	⅝" to 1¼" or No. 2 toolholder ⅝" square bit—High speed or carbide.	⅜" to ¾"	¼" to ½"	¼" to ⅜"	¼" to ⅜"
SPECIFICATIONS	4 tool, 12 positions 6" square. Price $99.00	4 tool, 12 positions, 4½" sq. Price $49.50	4 tool, 12 positions 3½" square Price $35.00	4 tool, 12 positions, 2½" sq. Price $23.00	6 tool, 12 positions, 2⅝" hex. Price $25.00

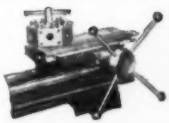
* Equipped with compensating spring—not required on smaller turrets.



Make of Lathe and Size	A	B	C	D	E	Maximum tool size desired

Prompt delivery can be made on all Enco Lathe Turrets. When ordering, give all dimensions and tool size.

Get the facts on Enco HEXTURRETS — the better bed turret!



Write Department 23. Ask for catalog showing 30 models for all lathes.

ENCO MANUFACTURING COMPANY

General Office and Factory: 4522-24 FULLERTON AVE., DEPT. 23, CHICAGO 39, ILL.

MECHANICAL MUSCLES

FOR EVERY LIFTING AND CARRYING JOB

Install PORTELVATOR. The Hamilton portable elevating table. One man can safely lift and carry loads previously requiring the strength of four.

Raises, lowers, transports. Three table surfaces. Accessible from four sides. Four point support. Standard model capacities, 1,000 to 5,000 pounds. Special models built on order.

Write for Bulletin P-47.

THE Hamilton TOOL COMPANY

HAMILTON • OHIO • U. S. A.

slightly rounded by hand honing or, in the hands of an expert grinder hand, this operation can be performed on the cutter grinder. However, it is quite the universal practice to break the corner of the cutting edge by hand honing.

Grinding Solid Carbide Blades

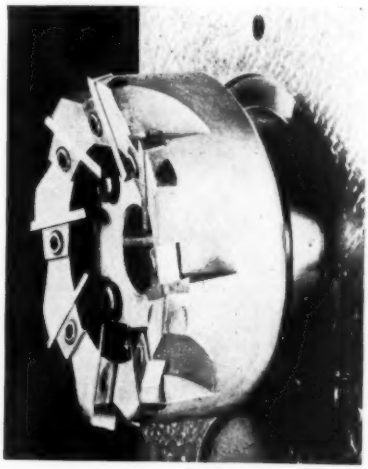
Recent developments in milling technique incorporate the use of solid carbide blades mechanically held. In addition the cutter body here becomes a precision tool holder that makes possible setting the blades after each blade is ground much as a single point tool is ground. The steps in this technique will now be briefly considered.

General Considerations

Fig. 8 presents a facemill of this design. Here the solid carbide blades are held mechanically by means of wedges pulled into position with Allen head

• • •

Fig. 8. A face mill in which the solid carbide blades are held mechanically by means of wedges.

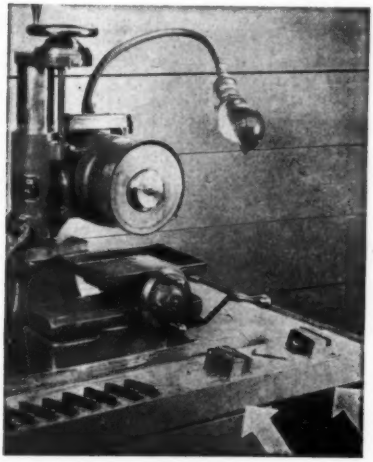


screws. The tolerances called for on the slot, wedge and blade dimensions are such that this cutter body can be considered as a precision tool holder; thus it is possible to set these blades after individual grinding, to repeat, similar to the operations involved in grinding a single point tool.

Fig. 9 presents a grinding block or jig such as is used for this grinding technique. The advantages claimed for this method are obvious. The skill required in cutter grinding has been transferred to a grinding block or jig as shown here; moreover the grinding of milling cutters of larger diameters is no longer a problem. Regardless of the size of the cutter the grinding of the blades presents no greater problem than the blades for a smaller cutter. This eliminates difficulties arising from restrictions due to a limited capacity of specific cutter grinders. Finally, the operation of grinding is simplified

• • •

Fig. 9. A grinding block used for grinding.



THE AMAZING NEW AUTOMATIC

"AUTOMARK" MACHINE

IS FAST AND VERSATILE

Write today for Facts and complete information

A Light Speedy Press

...For Assembly of Small Parts on production lines
...For Riveting and Staking Operations
...For Small Broaching Jobs
...For Marking Products and Various Parts

Operates pneumatically from your shop Air Line—with manual or automatic control — Regulated strokes, uniform pressure, s-p-e-e-d-y action, and easy and fast adaptability to all light marking and pressing jobs have made AUTOMARK an important production line machine.

Step up your Production

AUTOMARK ★ SAVES TIME ★

Consult our Engineers

DEFIANCE MACHINE and TOOL CO., INC.

1920-24 S. Vandeventer, Dept. BB
St. Louis 10, Mo.

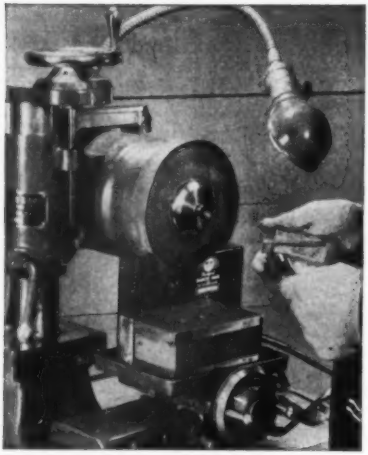
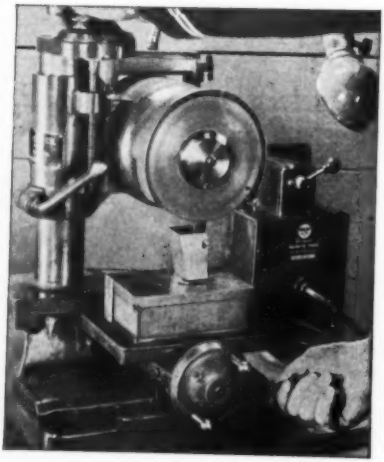


Fig. 10. Setting the blades in the grinding jig.

• • •

Fig. 11. Setting the face on No. 1. In this position the O D of the blade is properly ground.



to a few simple operations on a surface grinder. See Fig. 10 specifically designed for this operation.

The following steps complete the simple grinding procedure for this technique:

Step No. 1

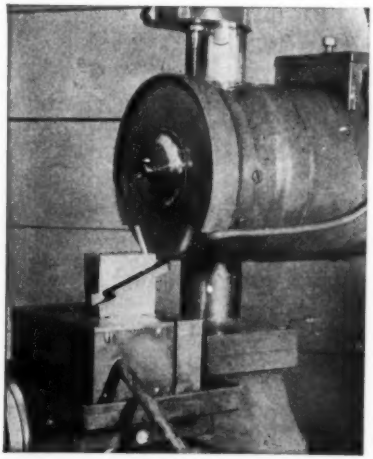
The first operation in the grinding of these solid carbide blades consists in setting the blade in the grinding jig and setting the jig on face No. 1 as shown in Fig. 11. In this position the OD of the blade is properly ground both for the primary and secondary clearances if these are desirable. All of the cautions set down previously regarding carbide grinding with diamond wheels must be observed for success in this technique.

Step No. 2

In this final operation the K-land or that portion of the carbide blade which comes into contact with the workpiece

• • •

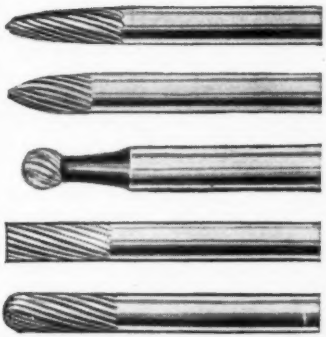
Fig. 12. Setting the blade for grinding the K-land.



New a "get-acquainted" package of Master-Ground Carbide Burs . . .

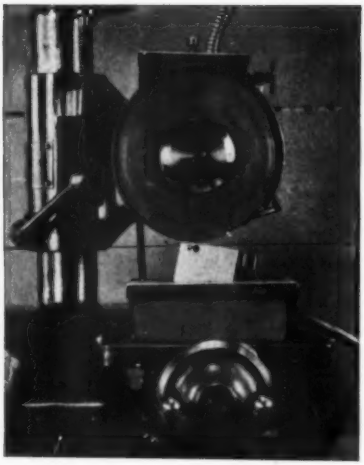
Packaged in a trim box with lucite cover, this set of five master-ground carbide burs will earn its keep in almost any shop. Each shape has many uses. Each is machine-ground from solid tungsten carbide and will remove phenomenal amounts of metal, leave a fine finish, retain true shape and "stay put" with amazing efficiency. Here is another example of P&W bur engineering—your assurance of faster cutting, finer work and low cost operation.

Place your order *now* for this handy set. Address KELLERFLEX SALES DEPARTMENT.



PRATT & WHITNEY
Division NILES-BEMENT-POND COMPANY
KELLERFLEX SALES DEPARTMENT
WEST HARTFORD 1, CONN.

Fig. 13. Setting the solid carbide blade in the block.



is ground at the proper angle. The cutting angle called for by this technique are presented in the table shown in Fig. 4. Setting the blade for grinding the K-land is shown in Fig. 12.

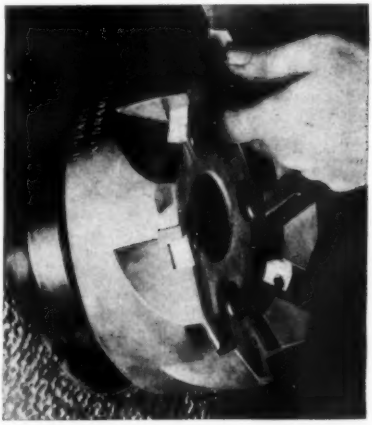
Step No. 3

The solid carbide blade is now set in the block as shown in Fig. 13. Here the grinding jig face No. 2 is set on the magnetic chuck for proper holding. This position brings the blade into correct relationship with the diamond wheel so that the face clearance angle can be properly ground. It will be noted that all the angles are built into the grinding jig and hence no settings are required in the machine by the operator.

After a set of blades has been ground they are then assembled in the cutter body, either on the machine as shown in Fig. 14 or on a fixture. The former method eliminates the run-out in the machine spindle—an advantage that deserves consideration.

• • •

Fig. 14. Assembling the blades in the cutter body.



WHEN YOU BREAK A TAP YOU NEED A

WALTON TAP EXTRACTOR

Prices range from $1.50 to $2.20 for the popular sizes.

The fastest, easiest, safest and most economical way to remove a broken tap from the work is with a WALTON TAP EXTRACTOR.

No Mangled Threads—
No Scrapped Work—
No Frayed Nerves

Write for Folder No. 12
and the
30-Day Free Trial Offer

THE WALTON COMPANY
94 Allyn Street Hartford 3, Conn.

NEW TESTED-ACCEPTED THREAD RING GAGES

5-PLUS FEATURES

1. Greater accuracy and stability
2. Longer wear life
3. Less weight
4. Positive identification
5. Positive adjustment

ACCURACY YOU CAN TRUST

WOODWORTH RING GAGES STILL PROVING "ON THE JOB" SUPREMACY OVER ORDINARY GAGES

No wonder more and more industries are adopting this gage as standard. Its revolutionary design assures wear life 5 to 7 times longer. And maintains accurate inspection.

This *proved* gage is easy to adjust, light in weight, durable—it's a *must* for cutting costs, increasing production. Just try the Woodworth Thread Ring Gage on your extra tough job—and you, too, will standardize!

Wire or write for folder No. 46R at no obligation.

WOODWORTH

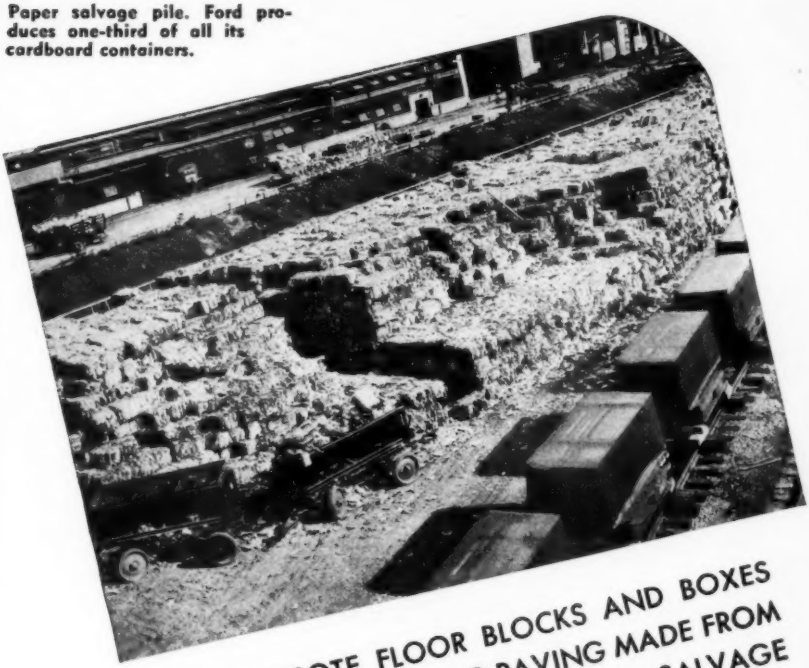
N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN

PRECISION GAGES • PRECISION MACHINE PARTS • DIAPHRAGM CHUCKS • ADJUSTABLE CLAMPING JIGS • SPECIAL TOOLS

How Ford Salvages Waste

HAMMERS, DRILLS, BOLTS, NUTS, RUBBER GLOVES ARE REPAIRED AND RETURNED FOR USE IN FORD PULVERIZED GRINDING WHEELS, NO JOB IS TOO DEPARTMENT.

Paper salvage pile. Ford produces one-third of all its cardboard containers.



AND BOOTS, CREOSOTE FLOOR BLOCKS AND BOXES PLANTS. FROM SCRUB BUCKETS TO PAVING MADE FROM TOUGH FOR THIS EFFICIENT REPAIR AND SALVAGE

800 HAMMERS are repaired each day in Ford's salvage and repair department. Barrels of drills, reamers, milling machine cutters, chisels, saws, counterbores, gages—all these, and many more pass daily thru this department at the River Rouge plant near Detroit. More than 200 men repair tools and parts and salvage materials.

Nobody has ever estimated how many thousands or hundred thousands of dollars are saved every year by this department. Fashioned after the packinghouse industry, where everything in the pig but the squeal is used in some way, very little material

finally lands on the scrap heap.

The 800 hammers a day for instance: special machines, designed and built by Ford workmen, punch out the old handles and put in new ones; cutting machines cut off the worn or damaged ends of the heads. Welding machines then weld on new heads. Finally, the hammers are refinished and restored to use on the production lines.

Big drills, dulled or broken in use, are machined into smaller ones. Broken chisels are welded back together, retempered, and placed back in work. One of the most interesting jobs is the resharpening of files. Ford uses thousands of them every day. Until the repair and salvage department was started 15 years ago, files lasted only a short time for want of a satisfactory resharpening method. But the repair department found a way. Thousands of dollars are now saved yearly by sandblasting sharpening machines which shoot streams of abrasives with terrific pressure, at the file, at the proper angle; thus almost restoring the file to its original usefulness. A file may be sharpened as many as 15 times before the metal is finally melted down and used again elsewhere.

Ford repair and salvage workers must be resourceful; consequently many smart ideas come out of this department every year. For instance, during war days there was difficulty getting enough rawhide to make the thousands of mallets used on the assembly lines, a substitute had to be found. Compressed paper was tried and proved wanting. Chips, torn loose from the mallet, endangered the workmen; wood was unsatisfactory for the same reasons. Somebody suggested trying the plastic substance which is used between layers of automobile window glass to make the glass shatterproof. This was vinol, but it was too precious for experimenting in the salvage shops. The salvage department then melted down piles of broken glass that had accumulated and extracted the vinol from the glass. The vinol was then compressed under high pressure into mallet heads. This turned the trick! Whether Ford ever returns to rawhide remains to be seen.

Another example of the ingenuity of Ford's salvage department concerns scrub-buckets. Many thousands of these are used to keep the large plant clean. Since the attaching fixtures are all standard, buckets had to be all the same size; It became a costly job to buy them. The salvage experts were called in, and they had the answer. They simply turned five-gallon paint cans, formerly junked, into scrub-pails, each with a special roller and bracket system, built on Ford-built mass production jigs. A few men turn out 300 pails a week, enough to supply all the Ford plants.

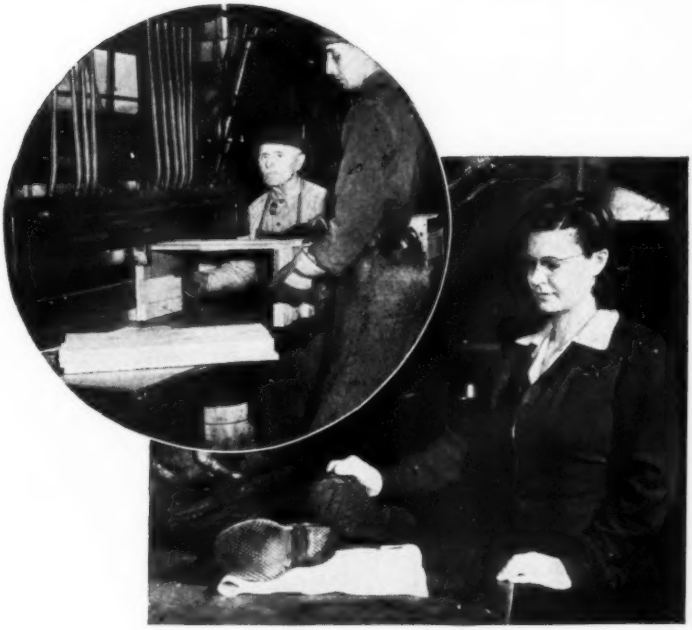
The wooden-soled, fabric-topped scrub shoes also are made in the salvage shops, the fabric part coming from scraps of the upholstery salvaged from the trim department.

Bolts and nuts, rubber gloves, aprons, blast helmets, special boots, scrap lumber, paper, and even the creosoted wooden paving blocks on the floors come in for their share of special attention by this department.

Older men are used mostly to sort the bolts and nuts. They look them over, drop the good ones into revolving buckets from which they are discharged electrically into proper bins. If they are stripped, burred, smashed, or too far gone to be rethreaded or cut to a smaller size, they are melted into scrap metal.

Nearly a truckload of rubber gloves are repaired every day in salvage and repair shops. Seventy-five to 100 pairs of rubber boots likewise go thru the salvage department every 24 hours. (See Fig. 1) Some of them are hip-length

One of the employees of the rubber salvage department is examining one of the thousands of damaged boots salvaged annually in the tire plant. The excellent work of this department is appreciated when the damaged boot is compared with the repaired article. (Insert) Nailing machine in action in one of the three box factories at the Rouge. This machine, capable of driving a dozen nails in a single operation, builds boxes on a mass production basis.



waders! Heels and soles are replaced until the tops become outworn. Sometimes five or six resolings are possible.

All rubber materials, including tubes from which valves have been torn or which have been cut or pinched on the assembly line operations, are utilized somewhere; no rubber is wasted. An entire department is devoted to vulcanizing machines, many of them of special types, built in the department where various rubber goods are repaired.

Every article received in the Ford salvage department is sterilized, if it is to be returned to use. Streams of disinfectant are squirted into mountains of boots, shoes, gloves, at one time. When rubber goods become so badly worn that even the Ford experts can's repair them, the material is sold for scrap to rubber companies.

Ford uses enough lumber every day in the Rouge plant alone to build four six-room frame houses. About half of

DUBLIFE
PLUG GAGES WITH
COLORED PLASTIC
COLLETS
(INSULATING)

GREEN
for "GO"

RED for
"NO GO"

DUBLIFE

Remember! — Colored Collets instantly identify plugs. They are weight reducing, lock securely and will not mar the finest finish.

United Precision Plug Gages are scientifically designed. They are made by skilled craftsmen from the finest gage steels. The latest in modern equipment for metal working and heat treating assures a high standard of perfection—dependable accuracy, maximum service at minimum cost.

UNITED PRECISION
PRODUCTS CO.
SHABONNA, ILLINOIS

it comes from the salvage department! A large part of the rest is grown on Ford land, logged by Ford workmen, and milled in Ford sawmills. It is even brought to the Rouge plant by the Ford fleet.

Most of this lumber is used in the three box factories, (Fig. 2) where an average of 5,000 boxes of more than 500 different sizes are built every day. They are used for everything from the packaging of nuts and bolts to the crating of engines. During the war, the giant Pratt & Whitney aircraft engines were built and packaged in the Detroit plants of Ford. If a board is split or broken, it is planed to a smaller size. All used lumber goes to the salvage department where boards, railroad ties, beams, boxes and crates arrive by truck or train from Ford plants, village industries, or farms.

Once at salvage, all lumber is knocked down to single boards or timber units and nails partly removed. Boards are then tossed on conveyors. Machines at the end of the conveyors pull the nails the rest of the way, an

• • •

Creosote cauldron at the Rouge. The workman has just lifted a tray of reclaimed blocks from the vat. Floors in all Ford buildings, excepting the foundries and open hearth, are made from these blocks.

A REAL HE-MAN JOB!
Both man and grinding wheel on this snagging job must be plenty tough . . . and toughness is one of the features scientifically "built" into BAY STATE SNAGGING WHEELS AND CONES. This rugged quality is not all. BAY STATE'S special resinoid and vitrified bonds assure faster, cleaner, stock-removing action, resulting in a definite increased economy. Our unique method of rigidly imbedding the steel nut, on the taper cup shapes, is an added safety factor.
Detailed snagging wheel bulletins . . . either portable snagging or for heavy swing frame and floor stand grinders are yours for the asking.
BAY STATE

Top Performance Consistently Duplicated

BAY STATE ABRASIVE PRODUCTS CO. • WESTBORO, MASSACHUSETTS, U.S.A.

average of two tons of nails in a single week. These are sent to the open-hearth furnaces for remelting into new steel.

At the three box factories, one uses all salvaged material; another uses half salvage and half new, and the third uses all new wood. Short ends are sawed into wedges and blocks. Outright scrap is sold for firewood and kindling. Sawdust is bagged and shipped to the Ford farms where it is used to bed farm animals. Some is burned and the ashes used for fertilizer.

The creosoted wood paving blocks (Fig. 3) loom large on the salvage list. Tens of thousands of them are used on the floors of the Ford buildings; routine repairs keep a full department busy 16 hours a day. All blocks removed from floors are inspected at once upon arrival at the creosote pits. Blocks not too badly cut or damaged are recut into smaller sizes, those unfit for further service are used as firewood under the

The building materials yard foreman examines a pile of worn and broken grinding wheels. These will be ground fine, mixed with cement and used as a durable finishing coat on steps or other places receiving excessive wear.

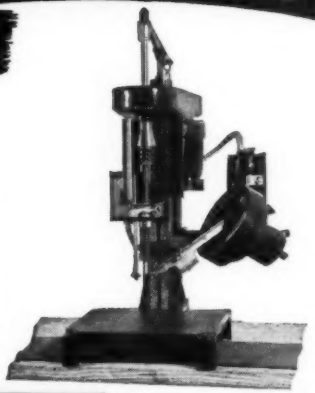
LET . . . . DETROIT POWER SCREWDRIVERS PAY YOU PROFITS

IN TIME AND LABOR SAVED

Yes, substantial profits through reduced costs and increased production. That's what you gain by using these popular, highly efficient machines — proven through years of constant use.

MODEL A PICTURED
Drives screws from No. 2 x 1/8 to No. 6 x 3/4.
A real production machine; drives screws at the rate of one second each. Will not mar screw heads or strip threads. TWO OTHER MODELS, driving screws from No. 6 to 5/8.

Send Sample Assemblies for Estimates and Free Catalog.



DETROIT POWER SCREWDRIVER CO. 2809 West Fort Street, Detroit 16, • Michigan

VERS-O-TOOL
means
VERSATILE

Here is a good illustration of good tooling. A good tool, like a good mechanic, is not limited to a single job.

The job is to machine Meehanite-cast crankshafts, 8¾" long. Three Namco Vers-o-tools—self-opening heads with circular cutters—were used to finish the long shank, on an Acme-Gridley multiple spindle Chucking Automatic. Entire series of operations was completed in 17 seconds.

Four circular cutters in each head provided more cutting edge, faster production, and assured concentricity. Single point cutters could never reach this speed of operation.

And the cutters can be replaced in one minute, without changing setup or affecting accuracy. Micrometer gaging is available for duplicating identical grinds on cutters. After cutter replacement, the first piece through is production—no need for "cutting and trying".

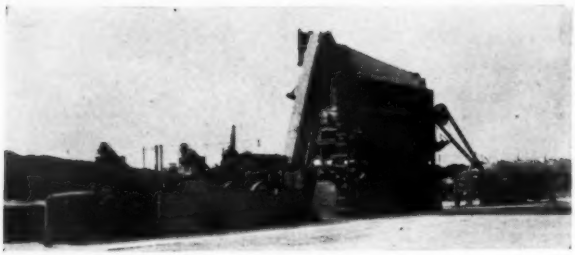
The same heads can be used for fast accurate threading, using ground thread circular chasers, with 10 to 50 times usual chaser life.

Catalog D-42-C will give you details.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley 4-6 and 8 Spindle Bar and Chucking Automatics - Single Spindle Automatics - Automatic Threading Dies and Taps - The Chronolog - Limit, Motor Starter and Control Station Switches - Solenoids Centrifuges - Contract Manufacturing



Stone crusher at the Rouge. Broken cement and stones from Ford plants and farms are here crushed into fine, medium and heavy gravel. Power is supplied by two Ford-Ferguson tractors.

creosote kettles. Usable blocks are boiled in the cresote preparation and stored. An average of 9,000 blocks are salvaged every day.

Even bricks and old grinding wheels (Fig. 4) find a useful new life after they have gone thru the salvage experts' hands. Bricks, from the high heat resistant types used in the metal furnaces, to the common red building variety, are cleaned, sorted and stored. Those that can't be used any more are ground into ganister, or brick dust, for use in the lining of ladles and troughs in the big blast furnaces and the steel mill.

The old grinding wheels are pulverized, mixed with cement, and used as a finish coat on steps and sidewalks where the traffic is especially heavy. Broken concrete and stones are ground (Fig. 5) into three sizes of gravel and used over again on the many miles of highway inside the 1200-acre industrial site.

Ford paper salvage (Fig. 6) became such a big business that the company built its own mills and produced a third of the cardboard containers and paneling used in the production of its cars and trucks. During the war the plant was turned over to paper production. Wastepaper is gathered from all the company's plants and sent to the Rouge paper mill, which employs 200 persons and would be a sizeable industry in itself in many towns. It is said to be the only paper plant in the country in which 100 per cent waterproof cardboard is made from wastepaper by the continuous process.

Are You Having PROBLEMS with small end mills?

Micro Miniatures

will help you eliminate them

Milling and engraving operations, that were impractical in the past with small end mills, can now be done with MICRO MINIATURE END MILLS. A new precision method of manufacture gives MICRO MINIATURES outstanding QUALITY and unusual STRENGTH for production use. MICRO MINIATURES will help you. They have eliminated milling problems for others.

SPECIAL SIZES to fit your job

STOCK SIZES
1/32" - 2 - Flute
1/16" - 2 - Flute
3/32" 2-3-4 Flute
1/8" 2-3-4 Flute
5/32" 2-3-4 Flute
3/16" 2-3-4 Flute

BALL ENDS
1/32" - 2 - Flute
1/16" 2 - 3 Flute
1/8" 2 - 3 Flute
5/32" 2 - 3 Flute
3/16" 2 - 3 Flute

SINGLE OR DOUBLE END
All sizes 1/4" Shank

Representation in principal cities—OR WRITE

WOODSON TOOL CO., INC.

4811½ W. Lennox Blvd., Inglewood, Cal.

Letter from England

ROBERT HUTCHESON, Editor
MACHINE SHOP MAGAZINE (London)

Coal has had a front place in the news for several weeks, and Britain was placed on a virtual war time footing during February in desperate attempts by the government to save dwindling coal supplies, after severe blizzards and storms hit the island. An emergency committee, consisting of cabinet ministers and representatives of the national coal board, electricity and railroad companies, was formed to battle the crisis.

The use of household electricity was limited to five hours daily. Violators of these stringent regulations were subject to heavy fines, a maximum of approximately £400 and prison sentences of as high as two years. Penalties of one kind or another extended to anyone who broke the rulings, and industrialists were no less exempt with respect to factory regulations.

The severe coal shortage had far reaching effects. Large and small industries had to shut down and between 5,000,000 and 6,000,000 workers were reported to be idle. Train cancellations were the order of the day, and passenger railroad service had to give way to coal trains both for the right of way and for the use of locomotives to haul the coal trains. Small shareholders sent prices of British government securities downward by persistent selling.

Workmen, idle as a result of other industries being down, were urged to take a hand at the moving of the coal. British troops, Polish soldiers and German prisoner of war laborers helped move the coal by shoveling snow from railroad tracks and highways.

Beleaguered villages, cut off from supplies by the heavy snowfall, begged for food. In Staffordshire, some relief was afforded by the dropping of provisions by parachute.

Nationalisation of the coal mines took place officially on January 1, and the mines are now under the control of the National Coal Board. Compensation in the region of £164,660,000 will be paid and although technically payment was due immediately upon transfer it will be some considerable time

before all compensation can be effected.

* * *

The New Year is the time for industrialists to give their opinions upon the year that has just gone and the next twelve months to come, and several of our leading industrialists predict a hard year ahead of us.

For example, Sir Clive Baillieu, president of the Federation of British Industries, feels that nationalisation of the mines and the pending nationalisation of other important industries casts a shadow over 1947. He is confident that as the need becomes better appreciated there will be an increase in coal production. In 1947 the school-leaving age of children will be raised from 14 to 15 years which means a loss to industry of about 370,000 young people. Lack of manpower must be made up by greater mechanisation.

Sir Alexander Roger, chairman of British Insulated Callendar's Cables, and the Automatic Telephone and Electric Co. Ltd. said that his companies' order books were full to overflowing and prospects of further orders at home and abroad were good. The main causes of anxiety lie in shortages of materials and difficulties of completing new buildings and obtaining plant.

SAVE HANDS WITH STRAND'S

Sweep Safguards

With the Strand Sweep double cam action, you obtain proper sweep movement that prevents accidents.

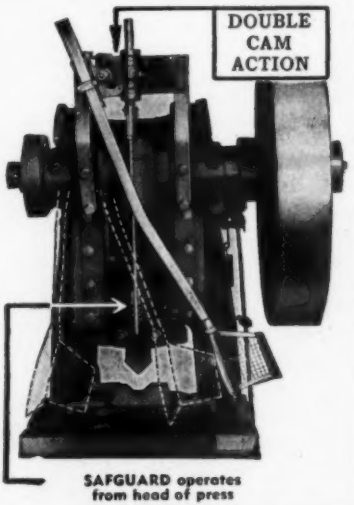
Operation of Safguard from press head provides additional safety in case of screw or other breakage.

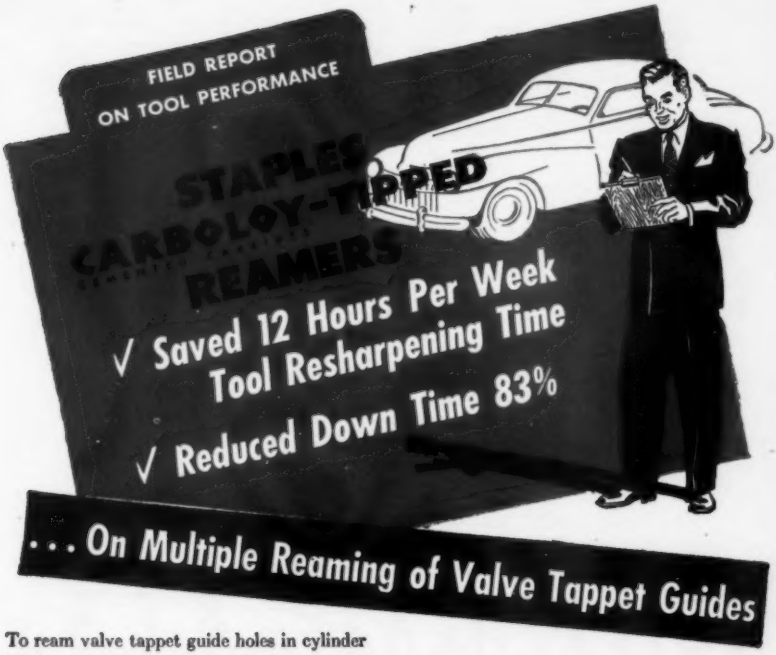
Send for Circulars on Strand Sweep and Enclosure Safguards

STRAND MFG. CO.

Safety Engineers

607 W. Lake St. Chicago 6, Ill.





. . . On Multiple Reaming of Valve Tappet Guides

To ream valve tappet guide holes in cylinder blocks, an automotive manufacturer used a multiple tool set-up of six H.S.S. reamers. Eight hours running time was the maximum production rate possible before reamers became dull and required resharpening.

At the recommendation of Staples Tool Engineers, the six H.S.S. reamers were replaced with special Staples Carboloy-tipped Reamers. As a result, tool resharpenings were reduced from five times a week to *once a week!* Prior to this changeover, the manufacturer had accepted the high tool cost as a production necessity on jobs of this type.

By replacing H.S.S.tools with Staples Carboloy-tipped Tools on routine as well as complex hole cutting operations, many manufacturers have reduced tool costs, improved tool performance and have eliminated frequent down time. *Your* production may also benefit. Call in a Staples Tool Engineer for an on-the-job demonstration. There is no obligation.

THE STAPLES TOOL COMPANY
CINCINNATI 25 **OHIO**
Distributors in Major Cities

Staples CARBOLOY-TIPPED CIRCULAR CUTTING TOOLS
REAMERS • CORE DRILLS • SPOT FACERS • COUNTERBORES • END MILLS • SHELL END MILLS • ALSO A COMPLETE LINE OF CIRCULAR SPECIAL TOOLS.

The biggest post-war contract of the Automatic Telephone and Electric Co. Ltd. has just been signed for the supply to Poland of telephone and other electrical equipment to the value of £600,000. Prior to the outbreak of war the company had a contract for the installation of telephones in Polish towns.

* * *

Prices of copper, zinc and lead have increased. Copper stands at £117 per ton, an increase of £19, and zinc has gone up by £15; lead has increased by £15 to £75 per ton. Prices have gone up outside the country and these external increases are the cause of the internal ones. Prices for non-ferrous metal scrap have also gone up.

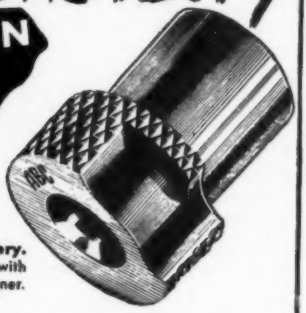
Higher prices of these essential metals will make themselves felt in new plant and equipment, and the increase will be passed on to the purchaser of machinery incorporating the non-ferrous metals. Costs of printing are likely to be raised because all three metals are used by the printer in considerable quantities.

* * *

The trend continues towards a five-day week and shorter hours for industry. The Austin Motor Company have adopted

INTERCHANGEABILITY

Your KEY to MASS PRODUCTION
Will Speed up Drilling and Lower Costs



A. S. A. STANDARD
PRECISION DRILL JIG BUSHINGS

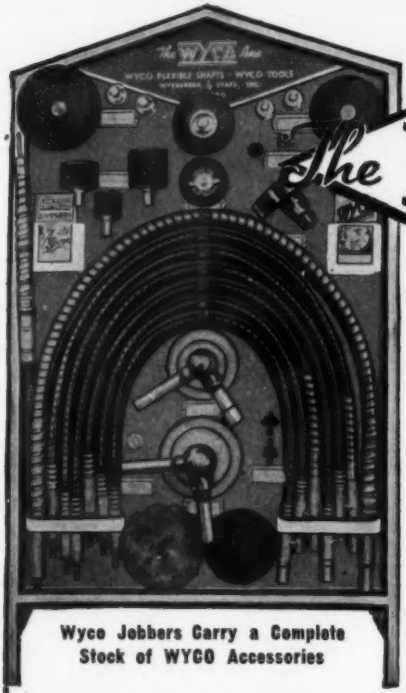
Standard sizes and styles in stock for prompt delivery. Write for catalog showing table of standard sizes of bushings with price list and other valuable information for the tool designer.

REPRESENTATIVES

NEW YORK, N. Y. Carlton Eberhard Wisconsin 7-9193
HOUSTON, TEXAS Chickering Tool & Equipment Co. W-6-8384
DAVENPORT, IOWA Davenport Engineering Co. Dial 2-2279
SEATTLE, WASH. H. P. Soderling Co. MAin 6036
*DETROIT, MICH. Booth & Shaw TEmple 1-4040
CHICAGO, ILL. Prescott Production Tool Co. Almitage 3364
*STRATFORD, CONN. Ellsworth Steel & Supply Co. BRidgeport 7-3317
PHILADELPHIA, PA. Albert R. Dorn DElaware 3553
LOS ANGELES, CALIF. Walter W. Miller PRospect 2687

*Stock carried at these locations

ACCURATE BUSHING COMPANY, 440 North Ave., GARWOOD, N. J. WEstfield 2-2415



Wyco Jobbers Carry a Complete Stock of WYCO Accessories

The WYCO Line

Sign of

FLEXIBLE SHAFT HEADQUARTERS

•

Let your WYCO Jobber Serve You from this Permanent Display—

WHATEVER YOUR REQUIREMENT *in* Flexible Shaft Machines, Shafts or Accessories

You can't go wrong when you depend on your WYCO Jobber. He can supply you from a complete range of the rugged, dependable WYCO machines that are setting records everywhere for longer shaft life and greater production — **yet cost less than many ordinary machines.**

Only WYCO Flexible Shafts have the WYCO Patented Non-Metallic Innerliner — There are no kicks about shaft breakdowns when it's a WYCO.

Send for New Condensed Catalog

WYZENBEEK & STAFF, INC.

841 West Hubbard St. **Chicago 22, Ill.**

WYCO FLEXIBLE SHAFT MACHINES and PROFIT PRODUCING TOOLS

the five-day week and will be closed on Saturdays and Sundays. As a help towards maintenance of production in spite of the shorter week this company has instituted a bonus for good time-keeping.

* * *

A Court of Inquiry is to be set up by the Ministry of Labour to investigate a dispute that has arisen between shipbuilding employers and trade unions. The workers are claiming a forty-hour, five-day week without a reduction in pay from the present amount.

* * *

Steel is of paramount interest and importance to almost every engineer, and therefore the news that British steel output for 1947 may be increased from 12,690,000 ingot tons (1946) to 13,000,000, or perhaps even 13,500,000 ingot tons, makes good reading. According to the Iron and Steel Federation production could be in the region of 13,750,000 ingot tons if fuel, scrap and transport were adequate.

Steelworks extensions now on hand should increase the annual capacity by 2,000,000 tons.

To off-set the coal shortage some plants are being converted for oil firing. By about April of this year it is estimated that

SYNTRON
REG. TRADE MARK

DEPENDABLE

ELECTRIC HAMMERS

DRILL—
CUT and
CHANNEL in
Concrete and Masonry

Easier — Faster — Cheaper

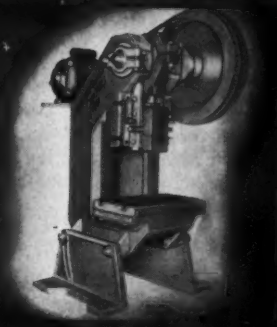
3600 powerful blows per minute
Light socket operation

Write for Folder No. 5-46

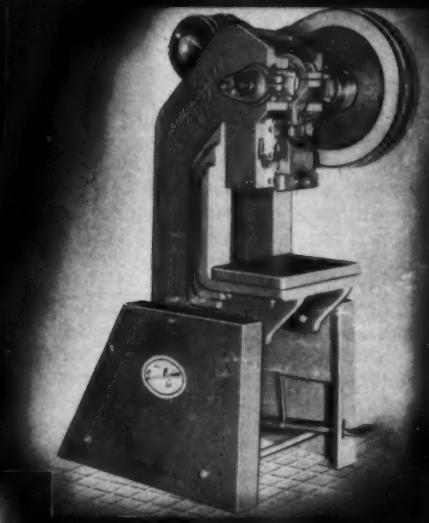
SYNTRON CO.
300 LEXINGTON HOMER CITY, PA.

Rousselle
PUNCH PRESSES

5 & 10 TON CAPACITY
BENCH PRESSES



5, 10, 15, &
25 TON O.B.I.
FLOOR MODELS



15 TON
HORN PRESS

FOR FURTHER DETAILS —
SEE YOUR DEALER OR WRITE US

MFRS. OF Rousselle PUNCH PRESSES

SERVICE MACHINE CO.
7633 S. ASHLAND AVE., CHICAGO, ILL.

there will be converted plant using about 400,000 tons of oil per year, and that by the end of 1947 the industry will be set up to consume about 1,000,000 tons per year. One ton of oil is approximately the equivalent of two tons of coal.

Exports of steel will be limited to those that the Government declare to be essential. These will probably be under 1,000,000 ingot tons.

* * *

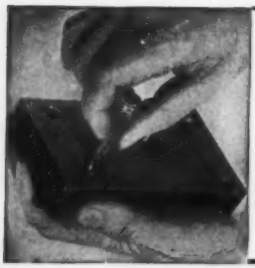
Priorities for steel fall into four classes, the atomic energy programme, mining, conversion of plants from coal to oil burning and housing. Outside these industrial groups there will be no system of graded priorities. So far as the requirements of the motor industry are concerned, if present supplies continue for the year the output of cars will be 400,000 which is rather higher than that of 1937 which was the peak pre-war year.

* * *

Nineteen vessels were launched in the Belfast and Govan yards of Harland and Wolff, Ltd., during 1946. The total gross tonnage of these vessels amounted to 180,574. The company's engineering works at these two towns produced marine engines (for propulsion) amounting to 310,190 indicated horse power. The tonnage of vessels launched is the greatest since 1914 when it was just over 2,000 tons more.

* * *

Two old established engineering firms, both are close on one hundred years old, have merged. Marshall, Sons & Co., Ltd., of Gainsborough and John Fowler & Co., Ltd., of Leeds are the firms concerned and both are makers of heavy diesel tractors on which products they will pool design and resources. Other lines that will continue to be made are diesel engines and locomotives, tea plantation machinery, threshing machines and wire drawing machines.



A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.

The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in $\frac{3}{16}$" to 1" diameters. *Send for price list.*

HEIMANN MFG. CO.

332 Lincoln Ave. Urbana, Ohio

FULL BALL BEARING CONSTRUCTION
"Multiple Barreled" Profit Makers
Special fixed-center THRIFTMASTER Drillheads to your blueprints. Standard Adjustable Drillheads are the popular 2- to 6-spindle in capacities to 1½" drills. Recommendations for standard or special drillheads made promptly and without obligation.
FIXED CENTER and STANDARD ADJUSTABLE
Drillheads
12 Spindles on fixed centers. For Drilling, Tapping, Reaming, Counter-sinking, End Milling, Spot Facing, Hollow Milling.
THRIFTMASTER
Reps. in CHICAGO ..... Gotz-Arnold Co., 1553 West Madison Street
CLEVELAND ..... T. I. Power Tool & Supply Co., 13413 Euclid Avenue
PITTSBURGH ..... Vose Machinery Co., 2002 West Liberty Avenue
BOSTON ..... A. B. Sherlin Co., 250 Park Square Building
DETROIT ..... B. E. Parish Co., 3248 Penhall Avenue
• Dealers in most cities •
THRIFTMASTER PRODUCTS DIVISION THOMSON INDUSTRIES, INC.

1947 MACHINE TOOL SHOW

The 1947 Machine Tool Show, world's largest exposition of a single basic industry, will be held in Chicago from Sept. 17 thru 26, it was announced today by Herbert H. Pease, President of the National Machine Tool Builders' Association.

The latest designs in metal-working machinery—new methods, new materials and new products—and every development that improves quality of durable-goods production—will be shown.

Theme of the show is "More goods for more people at lower prices."

The gigantic show will occupy 500,000 square feet in the Dodge-Chicago plant, near the Chicago airport. Lease for the space, part of the 94 acres of the plant which was built during the war, has been taken by the Association from the War Assets Administration and the Tucker Corporation, who now occupy the plant.

More than 250 exhibits, of machine tools, forging machines and other metal working equipment will be shown in operation in the largest industry exposition ever held.

Three previous shows have been held by the Association. These took place in Cleveland, Ohio, in 1927, 1929 and 1935. The 1935 show was attended by some 60,000 industrial executives and technological experts, who came from every state in the Union, and every industrial nation in the world.

Admission will be by invitation. The 1947 show will be attended by leading industrialists from home and abroad, as well as by supervisory production and engineering personnel. For the convenience of visitors, advance registration will be arranged by the Association, thru their offices at 10525 Carnegie Avenue, Cleveland 6, Ohio.

Each day during the nine days of the Show the doors will be open from 10:00 a.m. to 5:00 p.m. In the evening there will be technical sessions of the Machine Tool Congress at various Chicago hotels, headquarters for the participating organizations.

Directors of NMTBA are Messrs. Herbert H. Pease, Alexander G. Bryant, Lloyd D. McDonald, Louis Polk, Harry W. Bockhoff, Albert M. Johnson, William L. Dolle, Fred W. McIntyre, and Herbert L. Tigges.

PRECISION MEASUREMENT

By WARREN BAKER

Section II — Instrument Inspection, Cont'd.

Part 9 — Inspection of Cylindrical Square, Flats, Straight Edges, and Parallels

Inspection of the cylindrical square, often called a "master square" is done by the same methods outlined in the last installment. In fact, two of the photographic setups shown there were of the master square.

The cylindrical square is usually called a master square because its use usually is confined to tool inspection work, whereas the solid square and the universal square, which will be considered a little later, are more often used in layout work and production inspection.

The master square is a hollow cylinder of gage block steel, usually 4 or 5 inches long, with the ends parallel and the cylindrical side perpendicular to the ends. In use, it should always be set up on a toolmaker's flat or a surface plate of known accuracy. It is the tool inspector's best reference for perpendicularity and should be handled carefully, for the sides are highly finished and altho the material is exceedingly hard, the ends can be damaged if the instrument is carelessly used.

To inspect the master square for perpendicularity, simply set it up on a master flat or a surface plate and butt the side against a dial gage or comparator head setup. Rotate it all the way around and note any reading changes. Most cylindrical squares are made to a tolerance of 5 seconds of arc, so unless the instrument has been badly damaged, enough probably to be visible, the dial gage setup is not likely to detect any error. The setup with two comparator heads will do so, however. The 90° toolmaker's knee may be inspected by the same method as the cylindrical square, after first checking it with the straight edge, as shown in Fig. 1.

Inspection of the ends of the master square for parallelism, as in the case of other instruments supposed to have parallel ends or sides, will be gone into in detail in the later sections on the use of optical flats. Detection of errors in the cylindrical side of the square likewise will be explained then.

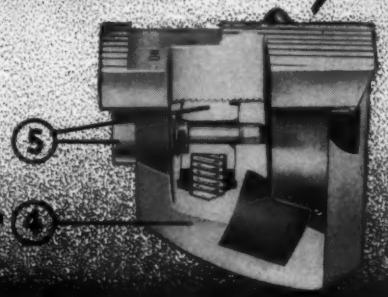
A simple method of making such an inspection, however, is provided with the electric comparator and a V-block, preferably one with highly accurate faces, such as the sapphire faced instrument shown in Fig. 2. Here the V-block is placed on the comparator, in the place of the usual anvil, the cylindrical square

Five Good Reasons Why...

JONES & LAMSON

Ground Thread

TANGENT CHASER



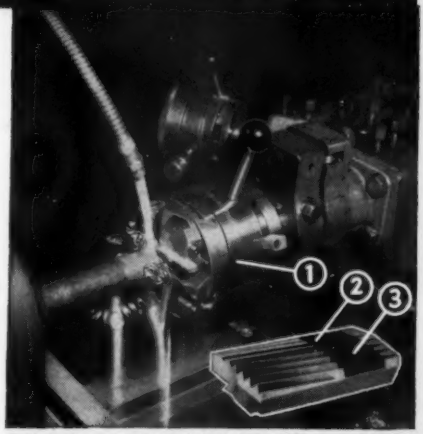
PRODUCE BETTER THREADS at LOWER COST!

THREAD QUALITY

1. They are hardened and ground throughout. The body is lapped on the face and in the dovetail slots. Chaser holder bearing surfaces are lapped into the body.
2. Chasers are guaranteed to produce threads of Class III fit.
3. Exact helix angle is ground into the chasers after hardening.

ECONOMY

4. Dies are universal, therefore investment in chaser holders is reduced to a minimum and change-over and set-up are speeded.
5. Chasers are set quickly and easily.



If you are interested in greater economy and better quality in threading, fill in the coupon and we will send you our valuable handbook "Thread Elements and Formulas", together with complete information about our Die Heads.

JONES & LAMSON
MACHINE COMPANY
Springfield, Vermont, U. S. A.

Manufacturer of: Universal Turret Lathes, Fay Automatic Lathes, Automatic Double-End Milling and Centering Machines, Automatic Thread Grinders, Optical Comparators, Automatic Opening Threading Dies and Chasers, Ground Thread Flat Rolling Dies.

COUPON

JONES & LAMSON MACHINE COMPANY
DEPT. 710A, SPRINGFIELD, VERMONT, U.S.A.

Please send me your handbook "Thread Elements & Formulas", and complete information about your Threading Dies.

NAME_____

TITLE_____

FIRM_____

ADDRESS_____

placed on its side in the V, and the comparator set to zero at that point. Then, by moving the square lengthwise and by rotating it in the V, any irregularities can be noted. Should any high or low sections beyond the gage maker's tolerance of 5 seconds of arc be found, they should be marked, so that particular area of the cylinder will not be used in inspection as an accurate square. A high magnification will have to be used on the comparator, however, and it should be noted that 5 seconds of arc is only about 2 hundred-thousandths of an inch, so the operator must be careful not to warm the instrument too much with his hands, otherwise his readings will become progressively more inaccurate.

HOW TO INSPECT FLATS

There are two kinds of flats normally used in tool room work, the surface plate, a large flat surface of varying size, often two or three feet long and some 18 inches wide, which may be made either of metal, usually steel, glass, or granite; and the smaller and more accurate variety known as the toolmaker's, or "master", flat. The latter usually comes provided with some sort of felt or other shock-absorbing base, or is furnished in a wooden box base. Other varieties may be circular in form and they are sometimes made of fused quartz instead of metal.

Most surface plates, several types of which are shown in the illustrations, are made to a gage maker's accuracy of about 0.0003" of flatness. Many are more accurate than 0.0003". This accuracy is about average with these instruments. They are made with surface finish capable of taking a wring with gage blocks, so that combinations of blocks may be built up directly from their faces. Such flats usually have lapped, rather than scraped surfaces.

In general, flats are tested for accura-

• • •

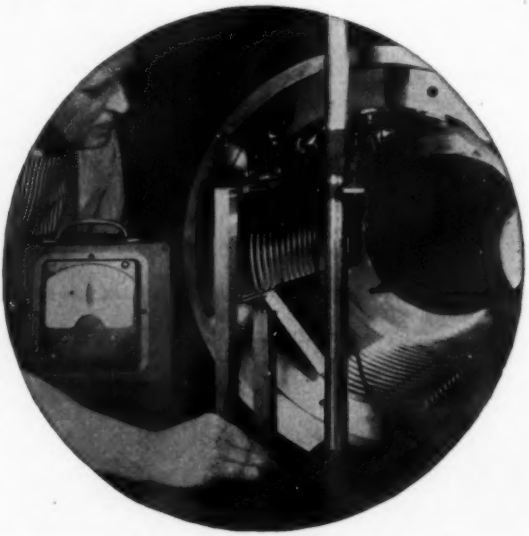


Photo A. High precision location - inspection work done on a large surface plate, with the aid of gage blocks and an electrolimit height gage. (Courtesy Pratt & Whitney division, Niles-Bement-Pond Co.)

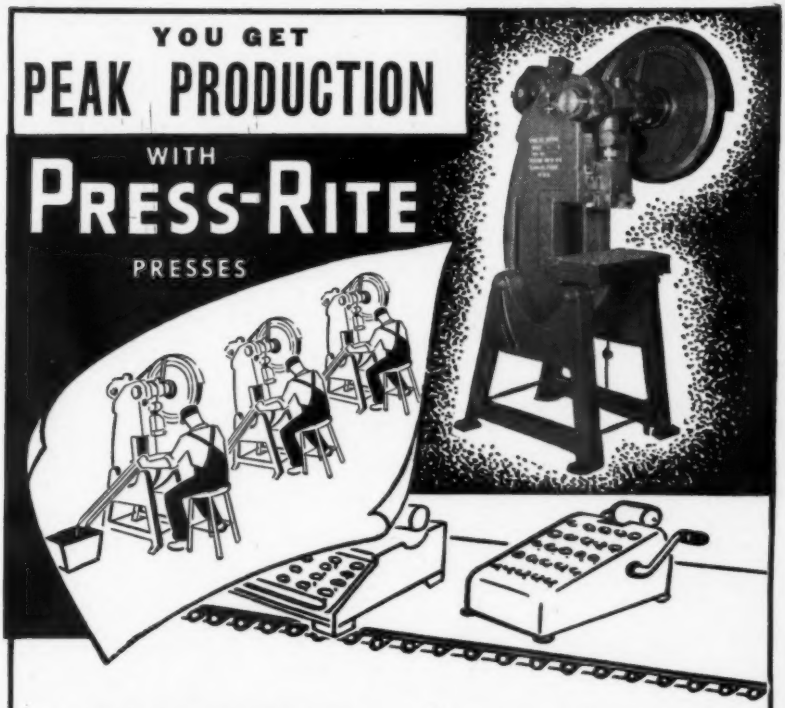
YOU GET

PEAK PRODUCTION

WITH

PRESS-RITE

PRESSES



PRESS-RITE PRESSES—will give you peak production on your production line. Many prominent manufacturing plants have standardized on Press-Rite Presses for Blanking, Drawing, Forming, Punching, and Stamping operations. Press-Rite Presses are built in several sizes to meet your requirements.

- **MODERN DESIGN**
- **PRECISION BUILT**
- **LARGE DIE SPACE CLEARANCES**
- **DURABLE**
- **DEPENDABLE**

For Complete Information Write to Dept. B-3

Sales Service Machine Tool Co.

2363 UNIVERSITY AVE. ST. PAUL 4, MINNESOTA

HANDEE • TOOL OF 1001 USES

Reg. U.S. Pat. Off.

JACK OF ALL TRADES AND MASTER OF PLENTY

It's quick, it's deft, it's conveniently small, yet the Handee Tool packs a terrific wallop!

Handee is the original, single hand controlled, electrically driven tool — and it's the finest today. It can be used at the bench or carried right to the job. It reaches hard-to-get-at places on machinery, touches up perishable tools, grinds dies, chip breakers on broaches, removes burrs, etc. Runs at a cool 25,000 r.p.m. AC or DC. Wt. 12 oz.

Combined with its accessories and exclusive attachments, the Handee Tool performs more operations with greater accuracy than any other portable electric tool at any price.

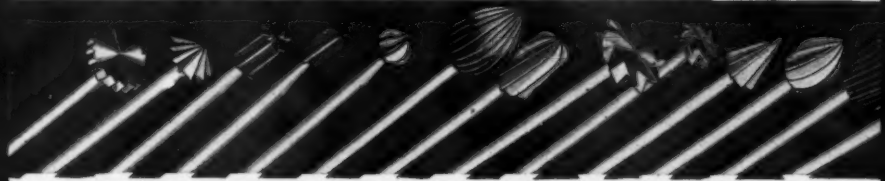
PRECISION ATTACHMENTS. Fit Handee only. Offhand carving, routing, shaping is exact as to depth of cut, accuracy of line. Indispensable to pattern shop. Set of 6, postpaid, $7.95

HANDEE KIT — Strong, compact steel carrying case holds the Handee Tool and a complete assortment of accessories. Postpaid, $27.50. Handee with 7 accessories only, $20.50

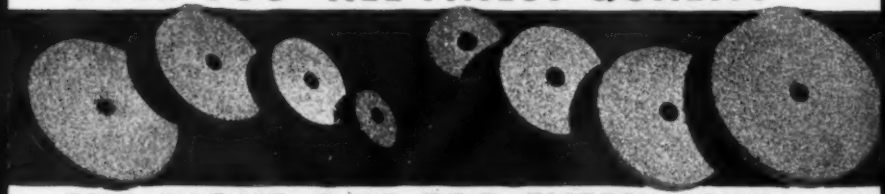
CHICAGO ACCESSORIES

Fit any Power Tool!

THE MOST COMPLETE LINE AVAILABLE



OVER 500—ALL FINEST QUALITY



THE RIGHT ONE FOR EVERY JOB!

WRITE FOR 64-PAGE CATALOG

IMMEDIATE DELIVERY
...ORDER NOW!

CHICAGO WHEEL & MFG. CO.
1101 West Monroe Street, Dept. HB, Chicago 7, Illinois
Please rush catalog.

Name .....

Address .....

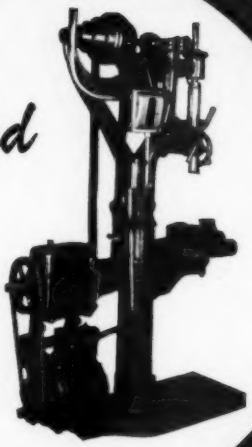
.....

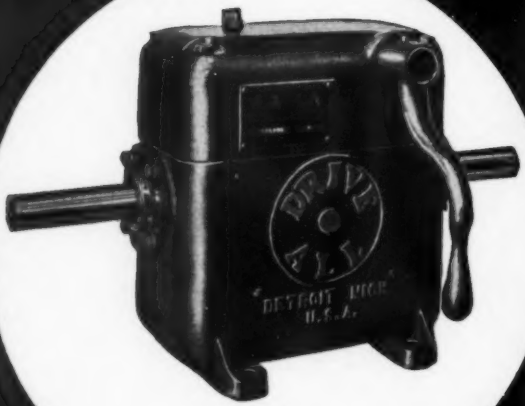
-ALL

ive Speed

SSIONS

ll types of industrial
uding conveyors, pro-
y, machine tools, and
NERY.





IMMEDIATE DELIVERY

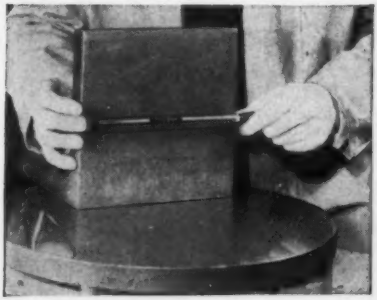
DRIVE-ALL MANUFACTURING CO. 3400 CONNER AVE. DETROIT 14, MICHIGAN

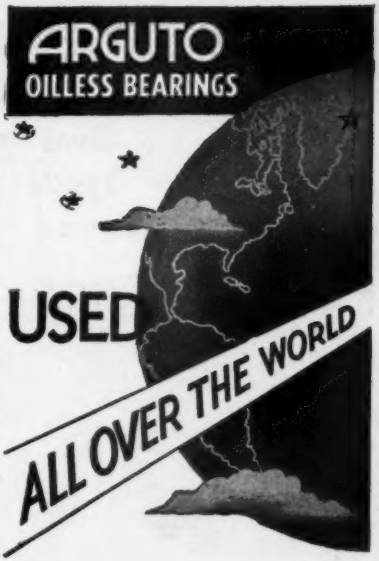
cy by placing straight edges across them, just as straight edges are usually inspected by placing them on a flat of known accuracy. The toolmaker's or master flat, being small, can be inspected to a high degree of accuracy merely by placing across it a good and accurate straight edge and checking for light between them. Or the whole flat may be placed on a comparator fitted with a wide anvil and moved about until its entire area has been checked under high magnification.

To inspect a surface plate, a long straight edge may be placed across the plate, lengthwise, sidewise, and cornerwise and the plate checked by means of the varying width of the band of light. If actual measurement of errors is required, a setup of three stacks of gage blocks, such as that shown in Fig. 3 may be used. Here the middle stack is being used to measure the error. The two end stacks are of equal height, while the middle stack may be moved about and blocks added or withdrawn to measure the actual amount of any high or low spots that may be discovered. Such high or low spots should always be chalked or otherwise marked, so they may be avoided in future work on that surface plate.

• • •

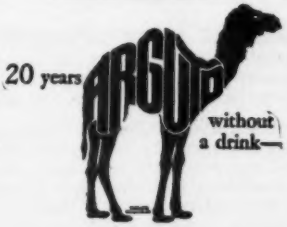
Fig. 1. Checking a 90° angle plate or toolmaker's knee with a straight edge.





. . . IN MANY DIFFERENT
APPLICATIONS

"OUTWEARS THE BEST BRONZE METAL"



ARGUTO OILLESS BEARING CO.
WAYNE JUNCTION PHILADELPHIA

"BASIC UNIT + PARTS" PLAN

Gives you EXACTLY the High Speed Production Lathe you need – *at Lowest Cost*

(LEFT) BASIC UNIT OF THE MINNEAPOLIS PRODUCTION LATHE to which you can add only the equipment needed for your particular production "set-up". 4 different drives.

(RIGHT) A SET-UP "TAILOR - MADE" FOR CUSTOMER'S NEEDS

Here is a "set-up" as ordered by a customer, including Basic Lathe with All-Electric Multi-Speed Drive (50-1500 RPM) — hollow stationary air Cylinder — rack and pinion Cross-Slide with longitudinal power feed — 6-station heavy-duty Turret with power feed — also complete special tooling.

SMALLER INVESTMENT — Lower Production Costs

The "MINNEAPOLIS" Production Lathe is extremely adaptable to any production set-up, particularly second operation work. Its simplified design and ease of control enable inexperienced operators to turn out high speed volume production.

The "MINNEAPOLIS" has 2¼" collet capacity, 14" swing, heavy duty spindle assembly. It is backed by more than 50 years designing and manufacturing experience. Send for literature — write us your production problems. Send sample part or drawing if possible—let us quote you on a "tailor-made" lathe for your work.

CENTRAL MACHINE WORKS CO.

Machinery Designers and Manufacturers Since 1890

1251 Central Ave. N. E. **Minneapolis 13, Minn.**

A somewhat simpler method of discovering and measuring high or low spots on a surface plate is with a height gage. The gage setup is made with a dial indicator. The indicator is then moved about and the amount of dial drop or gain noted. If it is beyond tolerance limit at any spot, that spot may be marked. Surface plates that have too many such spots, of course, will have to be rescraped, lapped, or replaced.

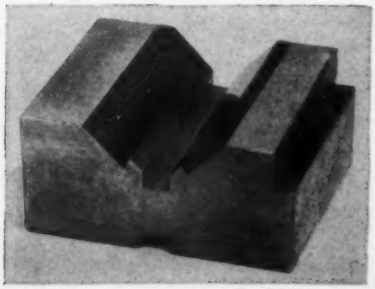
INSPECTING STRAIGHT EDGES

As noted before, straight edges usually are inspected by placing them across a toolmaker's flat of known accuracy and checking for visible light. However, if a more accurate method is required, or the actual amount of error must be measured, they may be set up in the comparator and measured to a millionth of an inch, as shown in Fig. 4.

Most small tool room straight edges of the type shown in Fig. 6 have either three or four blades. If of the three-bladed variety, the setup is quite simple. The straight edge is merely placed on

• • •

Fig. 2. Sapphire-faced V-block of high precision made by Elgin National Watch Co. Its high finish is of great aid in inspecting high precision instruments on the comparator. (Courtesy Elgin National Watch Co.)



SPECIAL!

Immediate Delivery

Send for Free 128 Page Catalogue

HIGH SPEED SIDE MILLING CUTTERS

Diameter	Width	Hole	Net Price
3	1/4	1	$4.80
3	5/16	1	5.11
3	3/8	1	5.33
3	7/16	1	5.62
3	1/2	1	5.92
4	1/4	1	6.66
4	5/16	1	7.47
4	3/8	1	7.47
4	7/16	1	8.36
4	1/2	1-1 1/4	8.36
4	5/8	1-1 1/4	9.10
4	3/4	1-1 1/4	9.83
4	7/8	1-1 1/4	10.57
5	1/4	1	11.16
5	5/16	1	11.16
5	3/8	1	11.16
5	7/16	1	11.16
5	1/2	1-1 1/4	11.16
5	5/8	1-1 1/4	12.34
5	3/4	1-1 1/4	13.46
5	7/8	1 1/4	15.75
5	1	1 1/4	15.75
6	1/4	1	14.56
6	5/16	1	14.56
6	3/8	1	14.56
6	7/16	1	14.56
6	1/2	1-1 1/4	14.56
6	5/8	1-1 1/4	16.13
6	3/4	1-1 1/2	17.74
6	7/8	1 1/4	20.99
6	1	1 1/4	20.99
7	3/4	1 1/4	25.42
7	1	1 1/4	29.79
8	3/4	1 1/4	33.76
8	1	1 1/4	39.46

Send for Free 128 Page Catalogue

Eastern Tool Supply Co., Inc.
178 GRAND STREET
NEW YORK CITY 10, N. Y.

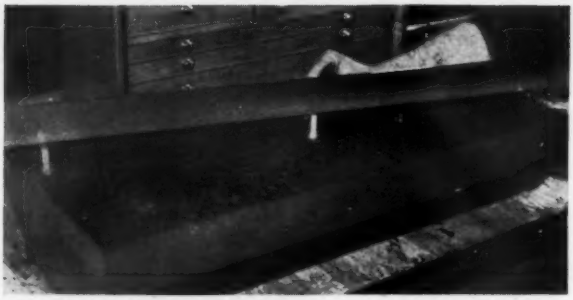


Fig. 3. Setup for measuring flatness errors in a surface plate.

• • •

the anvil, with two of the edges on the anvil, and the third edge measured from end to end under the spindle and the amount of comparator drop or gain noted. The straight edge is then rotated so that the next blade is on top and the procedure repeated, and so on. The comparator must be reset for zero to measure each blade.

The four bladed type, however, is a little more intricate. Here a V-block perhaps is the best holding device, although various inspectors have their own ideas on this subject. If the V-

A USEFUL ADDITION

Modern precision machine shops and inspection departments will find this sturdy 36"x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Can also be had in 38". Shipping weight 1200 lbs.

We also manufacture angles and parallels as shown underneath surface plate.

We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. *Write today for full information.*

J. C. BUSCH COMPANY ENGINEERS AND MACHINISTS SINCE 1907

165 SO. BARCLAY ST. MILWAUKEE 4, WIS.

block is used, care must be taken that each blade fits snugly into the bottom and sides of the V as the turn of its opposite blades comes to be inspected.

If very many such straight edges are to be inspected, a backstop had best be set up on the comparator anvil and the gaging head set at the proper angle so the spindle comes directly against the gaging edge of the blade. The blade may then be drawn under the spindle from end to end and the amount of dial drop or gain charted. Much time will be saved by this method, once the setup has been made on the comparator.

INSPECTION OF PARALLELS

Parallels of the type used for toolroom inspection are usually referred to as master parallels, and while of varying sizes, depending upon the type and the maker, always come in pairs with opposite surfaces parallel usually within about 4 millionths of an inch per inch of length. Flatness of the parallel surfaces usually is held by the gage maker to within 5 millionths of an inch in both length and width. The inspection grade should be wringable to the master flat.

They are used on the surface plate or the master flat for all sorts of special measurement setups, usually those where some part projects or where measurements must be made from a flange, as in Fig. 5. Measurements should always be taken from as near the middle of the parallels as possible.

Since they come in matched pairs, they should be inspected in pairs. The distance between parallel surfaces, for instance, need not be exactly the same among pairs, but should be the same, within the gage maker's limits, as between members of a pair. This is easily checked on the comparator, one of the pair being set up on the anvil and the comparator set at zero. Then the parallel is drawn under the spindle for its full length to make sure its width does not vary from one end to the other. With the comparator still set at the same zero, the other member of the pair is

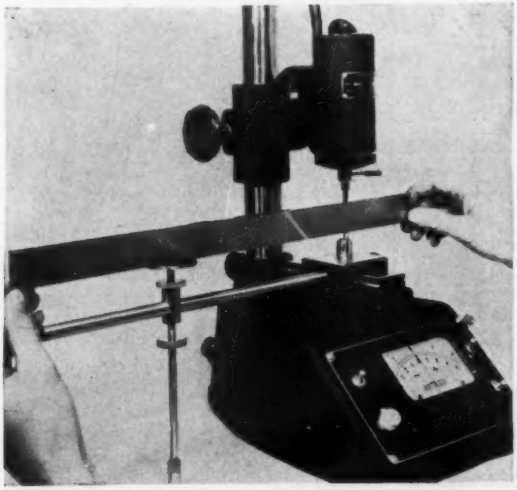
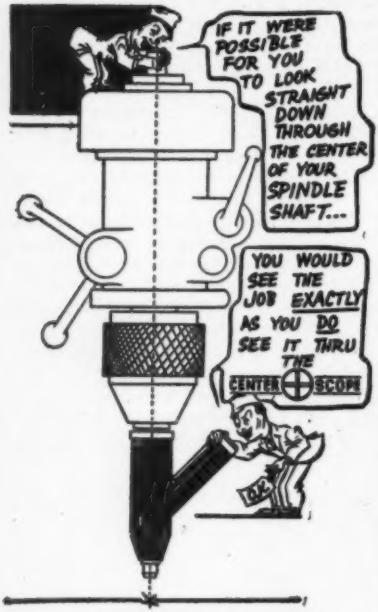


Fig. 4. Setup for checking accuracy of a straight edge on the comparator.

ONLY WITH THE
Center Scope
can you get . . .
UNQUESTIONED ACCURACY


IF IT WERE POSSIBLE FOR YOU TO LOOK STRAIGHT DOWN THROUGH THE CENTER OF YOUR SPINDLE SHAFT...
YOU WOULD SEE THE JOB EXACTLY AS YOU DO SEE IT THRU THE CENTER SCOPE

CENTER SCOPES ARE ACCURATE
Plus or minus one ten thousandth.

CENTER SCOPES ARE FAST
Line-up your layout in 30 seconds.

CENTER SCOPES ARE SIMPLE
ANYONE can use them.

INSIST ON THE GENUINE CENTER SCOPE

Write for Catalogue No. 8

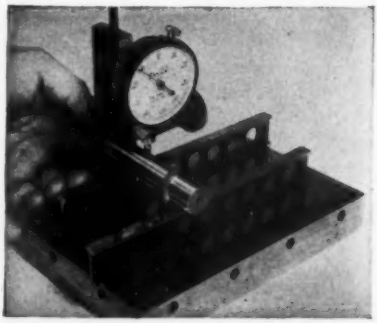
CENTER SCOPE PRODUCTS
3829 San Fernando Road
Glendale 4, California

then placed under the spindle and the same procedure repeated. This will give a check for distance between surfaces for the pair of parallels and will give a reasonable indication of parallelism. For a complete inspection for flatness and parallelism, however, the optical flats must be called in. This procedure will be discussed in detail in a later installment.

Parallels may be given a simple inspection for flatness, however, with the straight edge. The method here is the same as that for inspection of the master flat or the toolmaker's knee. Some varieties of box parallels which have

• • •

Fig. 5. One use of parallels is in measuring tools or parts with projections or flanges.



larger surfaces can be given a quick test for parallelism and equal height with the straight edge, as shown in Figure 6.

HINTS ON CARE AND HANDLING

The instruments described in this installment are all devices of high precision with the single exception of the average surface plate, and there are many tool inspection laboratories which possess surface plates of much greater

S&E TUNGSTEN CARBIDE *Bushings*

50 to 100 times
MORE WEAR—LIFE

Actual results in scores of large plants have firmly established

S&E TUNGSTEN CARBIDE BUSHINGS

for all drilling and reaming operations

Send us your specifications for prompt estimate

Furnished to ASA standards, or specially designed for any drilling or reaming requirement.

Mfrs. of Extrusion and Forming Dies, Hardened & Ground Tool Details, Precision Aircraft Parts, Etc., Etc.

S&E MACHINE PRODUCTS

BRIDGEPORT, MICHIGAN

GENERAL SALES OFFICES

306 PATERSON BLDG. FLINT 3, MICH.

accuracy than the "standard" one described here.

Surface plates especially are subject to careless use and damage. Heavy objects are dropped on them; the covers are left off or they are left for long periods without oiling and their surfaces corrode. By their very size, they are subject, more than the other instruments, to unequal expansion or contraction from heat or cold.

A good surface plate should be treated with the same respect as a good set of gage blocks. Keep the cover on it; if the surface plate is of metal, keep it protected with petrolatum when not in use; clean it carefully when its use is called for and, if damaged, mark the damaged spot with chalk or other substance and avoid that spot in your future measurements.

The small straight edges used in toolrooms likewise are instruments of high precision and their blades should be protected. Keep them in their own boxes and in using them, put the blade down carefully on the surface under inspection.

Parallels should also be cleaned and protected the same as gage blocks. If they become nicked or scratched, these usually can be removed by honing on a white Arkansas oil-stone. Inspection parallels should never be used as bases for heavy or rough work placed on surface plates. Use the production line parallels for this job. Keep the inspection instruments in their own felt lined boxes.

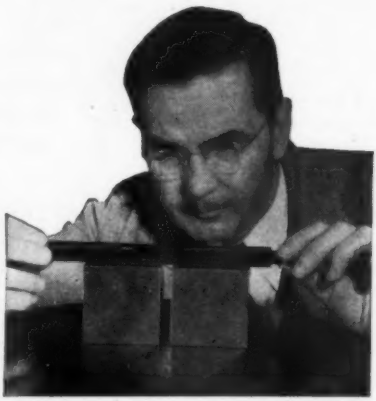
In placing rough castings or other production parts on a surface plate for layout work, location, or inspection of dimension, always place them on some suitable base such as an old set of parallels. All burrs should be first removed in any case. If rough or heavy parts are placed directly on a surface plate they may scratch or mar its surface. Such parts should never be placed on a master flat at all.

Minor flaws in a surface plate, such as high spots, may be removed by honing with a white Arkansas oilstone, or by lapping with any of the various compounds available in toolrooms for this purpose. The compound will depend upon the amount of the high spot to be taken down. It is best not to attempt to remove any serious defects in a master flat in the ordinary toolroom, however. They are made to much too close tolerances to be tampered with by any but the expert. If lapping machines of the type used to finish gage blocks are available, these may be used for this purpose but unless the work is done with great care, an even greater error in flatness is likely to result.

(The next installment will take up the use of the sine bar and inspection of various devices with it.)

• • •

Fig. 6. Some varieties of parallels can be inspected both for flatness, parallelism, and equal height with the straight edge, as shown here.



The Keen Satisfaction Of Getting The Right Spring the First Time!

When bringing out new products or revamping old ones, many leave the worry of spring selection to our engineers. To these specialists, torsion, extension, compression, free length, solid height, deflection, space, etc., and the properties of the various metals and alloys, are all in the day's work. They are intensely "spring minded" and will go a long way to see that the spring fits the job.

So, if you are ever in any doubt about the springs you need, we will, at your request, analyze your blue prints and make every effort to see that you get the right springs the first time!

PECK

SPRINGS & SCREW MACHINE PRODUCTS

THE PECK SPRING CO., 10 Grand St., Plainville, Conn.

The author analyzes three methods of heat transfer: conduction, convection and radiation and the types of equipment designed to accomplish these methods of heat transfer. Salt baths, lead baths, semi-muffle and full-muffle types of furnaces are discussed.

by Gordon Wheeler
The Sentry Co.

Most of us who are associated with metal and metal working are somewhat familiar with furnaces and heat treating equipment for ordinary steel hardening. Not all, however, are as well acquainted with equipment and processes for higher temperature work such as, for example, the hardening of High Carbon High Chrome die steels and High Speed tool steels. By virtue of their chemical analyses these steels are more exacting in requirements in order to product perfect dies and tools. This condition is especially true in the High Speed Steels.

Requiring as they do, the application of high temperatures — temperatures that closely approach melting points.— it can be fully appreciated that furnace design and construction must be such as to permit close regulation of work chamber temperatures. Not only must the work chamber be held closely to a desired temperature but, in addition, this temperature must prevail thruout the entire chamber space. If these conditions are not met, the work will not be heated evenly and spoilage will result. Any furnace that is built to operate at temperatures up to 2500°F. is essentially a specialized unit. Many materials commonly found in units for lower temperatures will not withstand the action of high temperatures. It is not a case of merely introducing more heat, but one that requires the incorporation of materials, especially those of a refractory nature, that will complement each other in producing the desired control and distribution of the heat.

Several leading manufacturers of metal heat treating equipment build high temperature furnaces that are well

designed and engineered. Many types of such equipment are available and the decision as to which type is most suitable will depend on the individual requirements of each application. Among the factors affecting a choice of types are fuel supply available, volume of work to be handled, size of the individual tools, types of finish desired and the types of steel from which the tools or dies are produced.

While the preceding has established several requirements for high temperature furnaces, it is reasonable to assume that lower temperature furnaces should be designed and built to the same standards. It is true that refractory and insulating materials used need not be as high in temperature resistance nor as low in thermal conductivity. Furnaces operating in a range of 1200° F. to 1600°F. do not lose heat by radiation from the outside as rapidly as higher temperature units and do not need as much insulation to prevent excessive heat losses.

Lower temperature equipment does, however, require careful design on the interior. It is just as essential that heating be uniform in such furnaces as it is in furnaces for high alloy steels. Carbon steels require correct hardening temperatures just as much as the high alloy steels. While their hardening temperature range might be somewhat wider, still in order to produce proper hardening for a specific purpose, temperatures must be held within close limits. Furnaces or other equipment for accomplishing the heat treatment of metals are primarily sources of concentrated heat, and exist in various sizes and types.

THREE METHODS OF HEAT TRANSFER

The process of heat transfer is accomplished in one of three ways, or in combinations of two or more of these. First of the means of heat transfer is known as Conduction, which is the transfer of heat from it's source to the point to be heated by means of contact of the part to be heated with the heating medium, or an intermediate transferring medium. To illustrate conducted heat; if one end of a steel rod is heated, the other end will become warm due to conduction of the heat along the rod.

A second means of transferring heat is known as Convection. This type of heat transfer is accomplished by heating air or other gases and passing the heated air or gases around the body to be heated. The old residential hot air furnace and the more modern air conditioning systems employ this method in heating buildings and their contents.

The third, and perhaps less well known method, is Radiation. This is the phenomena of heating neither by direct contact nor by a movement of heated gases, but by a form of wave motion without any contact with any heating medium. In looking at a hot object relatively close to, the heat felt on one's face is from radiation. Sunburn is a burning of the skin surface due to heat radiated from the sun.

While some may consider as another means of heat generation, the recent development of Induction or High Frequency heating, for the purposes of this article we will consider only the three mentioned means of heat transfer.

CONDUCTION

Under the heading of Conduction we find the Bath Type of heat treating equipment using molten lead or salts such as Sodium Cyanide, Barium Cyanide, Potassium Cyanide, etc. Fundamentally the Bath Type of equipment, generally known as a Lead Bath or Salt Bath, comprises a pot, Fig. 1, to hold the solution, a means of heating the pot and a casing to enclose the heating chamber and to support the pot. Heating can be accomplished either by the use of oil or gas burners, elec-

Watch SCHERR for latest time-savers in precision-production

SCHERR "TENTHS" MICROMETER, with sharply inscribed vernier giving 1/10,000" readings, at no extra charge for this feature . . . CHESTERMAN HEIGHT GAGE, a stabilized vertical gage reading in both thousandths and millimeters. 3 sizes—12" to 48" . . . WILDER PROJECTOR compares a magnified image with a master drawing of the part, instantly detecting inaccuracies . . . COMPARITOL—visual, magnifies readings to tenths without dependence on "feel". Used widely in volume inspection . . . GAERTNER TOOLMAKERS MICROSCOPE—magnified visual inspection of small part profiles. Enables direct and angular measurement . . . MAGNI-RAY—magnifies and flood-lights work under inspection . . . MAGNE BLOX—greatly increase usefulness of magnetic chucks, holding work vertical or at an angle, holding odd-shaped parts, etc. . . . TACHOMETERS — and revolution counters. Extremely accurate in measuring surface speeds as well as rpm . . . PRECISION CALIPERS of stainless steel . . . ULTRA-CHEX GAGE BLOCKS accurate to .000008". Large and small sets, for all needs . . . ALL PURPOSE GRINDING FIXTURE—quick, simple and accurate way to grind correct angles on cutting tools. Write for individual bulletins.

HERE'S A BOOK YOU OUGHT TO HAVE

96 pages of profusely illustrated data on details and use of precision and production tools of all kinds, including those listed above and many others. A handy-sized and valuable reference manual. Your request on your business letterhead brings a copy. Write.

GEO. SCHERR CO., Inc. 198 LAFAYETTE STREET NEW YORK 12, N. Y.

How One Manufacturer Profits by BEAR DY-NAMIC BALANCING

Reports the Dynamic Air Engineering Co. of Los Angeles: "Bear eliminates the "Wobblies" of un-balance in high speed axial flow propellers faster than 20 per hour to a 3 mil displacement tolerance." Here, as always, the Bear machine is so small in size, and so quick, that the operation fits readily into production.

Any shop hand can learn Bear-Balancing in less than a day. Every Bear machine is widely adaptable within its range. Each balances bodies to the recognized standards. All are very reasonably priced. Write for new literature . . . chase the "Wobblies," of dy-namic and static un-balance . . . improve both product and sales! BEAR MFG. CO., Industrial Div., Dept. M-20, Rock Island, Ill.

BEAR

COMBINATION

STATIC AND DY-NAMIC BALANCING MACHINES

trically heated units surrounding the pot, or by electrodes immersed in the solution inside the pot itself. For high temperature operation the preferred media of heating are either gas burners or the more modern immersed electrode type.

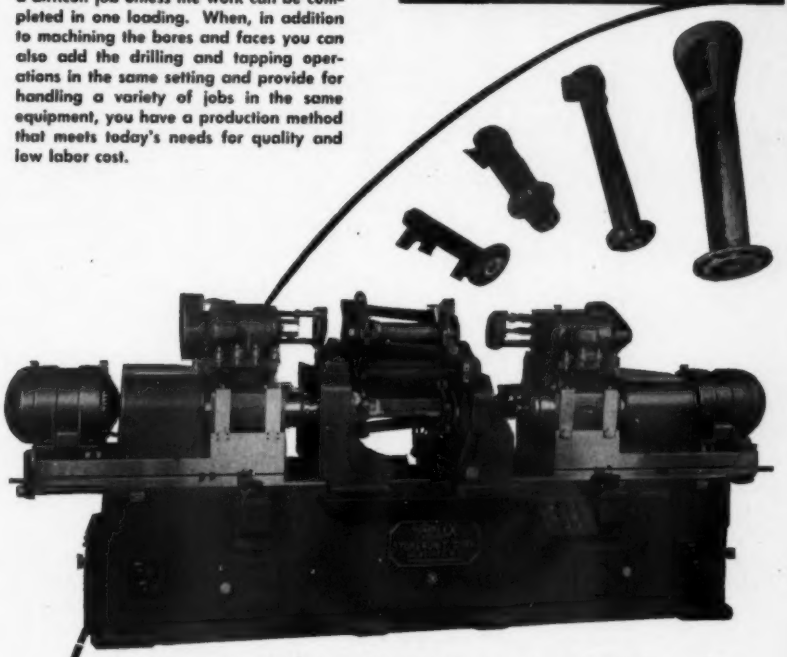
Lead Baths are widely employed in production hardening of carbon steels. Salt Baths are generally used for large volume continuous production operations where the relatively high overall cost of operation can be absorbed by the quantity of work produced. A typical high speed steel Salt Bath installation will consist actually of three baths, one for preheating operating in the vicinity of 1400°F. to 1500°F., one for high heat operating in a range of 2200°F. to 2400°F., and one for quenching or drawing operating at about 1050° F. Salt Bath hardening will produce excellent quality work. Since the work is completely surrounded by the molten salt during the heating period, no air can come in contact with the work and scaling and decarburization do not occur.

Fuel fired Salt Bath equipment must have the combustion chamber so designed as to provide ample space for expansion of the combustion gases. If this chamber is too small, a blast effect will be set up causing hot spots on the pot, which in turn will cause rapid deterioration of pots and serious salt decomposition. If the chamber is not correct, combustion efficiency will be lost with correspondingly increased fuel costs.

The material from which the pot is made will depend entirely on the type of heat treating salt used. Usually high speed steel hardening salt pots are made of alloys of nickel chromium and steel, with nickel being the predominant metal. Some prefer a pot as free from nickel as possible in the quench or drawing bath to prevent the possibility of the nickel plating out on the work.

SIMPLEX

Machining tubular parts where the bores must be concentric, the faces parallel, is a difficult job unless the work can be completed in one loading. When, in addition to machining the bores and faces you can also add the drilling and tapping operations in the same setting and provide for handling a variety of jobs in the same equipment, you have a production method that meets today's needs for quality and low labor cost.



The machine pictured is a SIMPLEX 4U 2-way Precision Boring Machine with four #4 spindles mounting combination boring and facing heads and also carrying unit type drilling heads with bushing plates for the drilling operation. By changing the fixtures, drills and boring tools, the various pieces illustrated can be handled with the same machine, thus this machine becomes in effect a production department in itself.

Precision Boring Machines

STOKERUNIT CORPORATION

SIMPLEX Machine Tools Division

4530 West Mitchell Street, Milwaukee 14, Wisconsin

Precision Boring Machines, Planer Type Milling Machines and Special Machine Tools

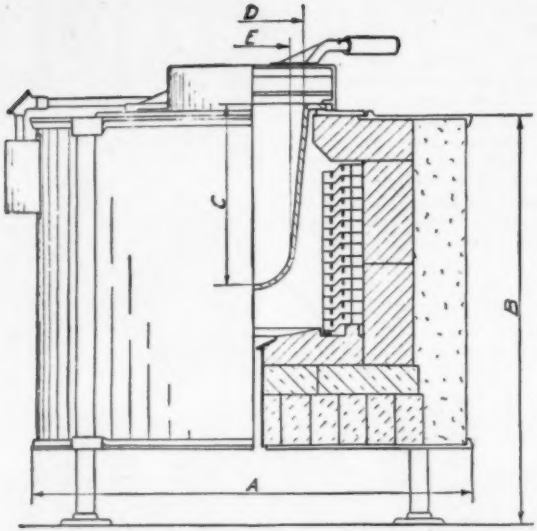


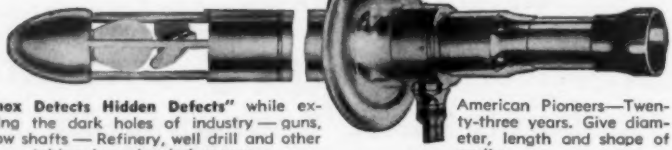
Fig. 1. An electrical external heated pot type furnace.

• • •

In such cases, pots of a chromium and iron alloy are used with iron being the predominant metal.

It is especially essential that the design of the furnace be such as to provide suitable means for preventing cyanide or other fusible salts from entering the furnace chamber. Fusible salts react with the scale formed on the outside of the heat resisting alloy pots. This reaction is one of a continuing nature and causes rapid reduction of the pot wall thickness with consequent premature pot failure. Salts of an alkaline nature

ILLUMINATED INSPECTION BORESCOPES



"Lenox Detects Hidden Defects" while exploring the dark holes of industry — guns, hollow shafts — Refinery, well drill and other tubing, irregular dark spaces.

American Pioneers—Twenty-three years. Give diameter, length and shape of cavity.

LENOX INSTRUMENT COMPANY

2008 CHANCELLOR ST. PHILADELPHIA 3, PA.

EDLUND

Drill-O-Matic

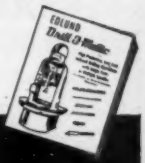
Features Maximum Production and Multiple Operations

The Edlund DRILL-O-MATIC gives special purpose utility and maximum production for drilling operations . . . without the danger of obsolescence and resultant high costs. In contrast with usual single purpose drilling equipment, the DRILL-O-MATIC is a highly versatile machine that is easily adapted to multiple operations on pieces of widely different size and shape.

Spindle cycles and table indexing are both hydraulic and can be set for automatic or semi-automatic operation.

With single tools or multiple spindles, the DRILL-O-MATIC—

- **Drills**
- **Reams**
- **Taps**
- **Counterbores**
- **Countersinks**
- **Spot Faces**
- **Flycuts**



Write for DRILL-O-MATIC Bulletin.

EDLUND MACHINERY CO. INC., CORTLAND 3, N. Y.

TOUGH FLOOR RESURFACER

Makes Solid Patches or Complete Overlay

Use tough RUGGEDWEAR resurfacer over wood or concrete floors. Here is a material which will stand up under the most punishing traffic conditions. Simple to install—there is no chopping or chipping required. You merely sweep out the spot to be repaired—mix the material—then trowel it on. Holds solid and tight right up to irregular edge of old concrete. RUGGEDWEAR provides a firmer, tougher, smoother, more rugged wearing surface. Used indoors or out. Dries fast.

Mail Coupon for FREE TRIAL OFFER

FLEXROCK Co.,
3634 Filbert St., Philadelphia 4, Pa.
Canadian Office: 21 King St., E., Toronto, Ont.

Please send me complete RUGGEDWEAR information . . . details of TRIAL ORDER PLAN—no obligation.

Name .....
Company .....
Address .....

tend to flux the brick work and refractory materials in the combustion chamber necessitating frequent and expensive rebuilding.

The internal or immersed electrode type of salt bath furnaces, not requiring any combustion chamber, can be built to almost any size or shape and units can be placed immediately adjacent to each other for compact installation. In some large quantity production installations a fourth unit is included which operates at about 1800°F. and serves to prevent material temperature reductions when heavy batches are placed in the high heat bath.

The immersed electrode bath is heated by means of the heat generated by the resistance of the liquid salt to the passage of an alternating current between the electrodes. Due to the flow of the current and to the natural laws of physics, these baths are self stirring and tend to maintain an even temperature thruout. Electrode positioning varies among the several manufacturers, each featuring their own design. One installs the electrodes thru the bottom, thus permitting extreme depths for extra long work without requiring the use of impractically and uneconomically long electrodes.

Since heat is generated within the bath itself, pots can be of metal or ceramic or can be metal faced with a refractory or ceramic. Rectangular pots provide larger work capacities and simplify construction.

Current will not flow between electrodes unless the salt is in a liquid state and therefore some means of establishing such a condition must be available before the equipment can be put in operation. Usually a gas torch starts the melting around the electrodes. From then on the current flow will continue to heat the salt until the proper operating temperature is reached.

With all types of salt baths provision should be made for exhausting fumes.

Salt mixtures tend to become contaminated by the salt carried from one bath to another and should be frequently checked for chemical composition to prevent work spoilage. Work to be hardened should be as clean as possible both to prevent excessive contamination of the bath and to produce quality hardening.

CONVECTION

For all practical purposes, the bath type of heat treating equipment is the only type to be classified as a Conduction unit. The next classification is Convection. While furnaces included in this classification are not strictly convection heated they depend sufficiently on convection or movement of hot gases in the heating chamber to properly be so classified.

In most cases, units of this type will be fuel fired—either by oil or gas. The furnace is the conventional box type with a heating chamber in which a hearth is placed. Space under and around the hearth provides for combustion of the fuel. The hot combusted gases are driven up by each side of the hearth and into the working space and finally exhausted at the top.

To obtain sufficiently high temperatures to harden the high alloy steels, it is desirable to force feed both fuel and air. Unless a good supply of compressed air is available, some sort of a power driven blower will be necessary. Temperature regulation is obtained by controlling the amount of fuel and air supplied. As is the case with all fuel fired equipment, this control can be either manual or automatic, with the automatic type to be preferred for proper work quality.

This type of furnace is difficult to heat evenly due to the turbulence of combustion. On high temperature work relatively high air pressures must be used to reach the desired temperature, resulting in additional turbulence and loss in heating efficiency due to the high temperatures of the exhausted

the right line
for
the right blade
THE Star line is the right line because it's really complete. At your Star supplier you'll find a blade for every job a hack saw or band saw can do. In addition, you'll get the right blade because your Star supplier is backed by a complete line of blades that have proved faster, longer wearing, in cutting metals, plastics, and other non-metallics. See your Star supplier – he has the right line, the right saw for you. It's Star.
This booklet is packed with facts on saw selection, use, care – prices, too. Get your copy from your Star supplier . . free.
Star
HAND BLADES
POWER BLADES
STAR
FRAMES
BAND SAWS (Metal Cutting, including Skip-tooth)
Sold only through recognized distributors
CLEMSON
CLEMSON BROS., Inc., Middletown, N.Y.
Makers of hand and power hack saw blades, frames, metal cutting band saw blades and the Clemson O-T-T lawn machine

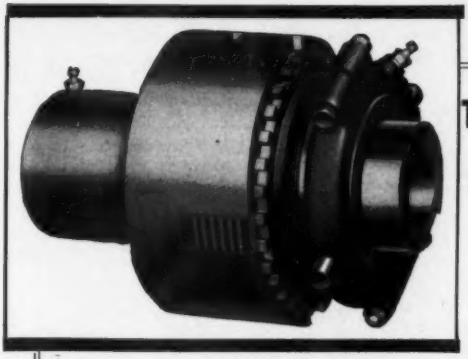
Fig. 2. A large semi-muffle type electric furnace showing hearth and heating element arrangement.

combustion gases. Some means of exhausting these gases from the building should be provided both from the point of view of safety and that of comfort of the operator. Little opportunity is given for flame adjustment to alter the atmosphere within the work chamber and therefore work produced from this type of equipment will be found to be rather severely scaled or decarburized or both.

In modern shops it is only rarely that the convection high temperature type of equipment is encountered. Most of them have either changed over to or made new installations of the Radiation type.

RADIATION

In this classification are to be found both semi-muffle and full-muffle type units. In either type, the products of combustion or heat of that combustion do not come into direct contact with the work. The muffle or muffle sections are heated directly and the walls and floor of this chamber impart heat to the work primarily by radiation, although some heat is transferred by con-



The First Real *SIMPLIFICATION* in the CLUTCH INDUSTRY

It takes courage to break tradition . . . to strike out boldly in the face of too-inflexible and too hide-bound methods of design and production.

Now obtain...free of all complex and superfluous parts...

STANDARDIZED

CONWAY CLUTCHES

WITH INTERCHANGEABLE PARTS

Patented in U. S. A. and Canada

Not a radical departure . . . but a great step forward which will effect unparalleled economies in operation and maintenance.

Precision engineered . . . precision designed . . . entirely machined from basic materials.

Photograph shows Model Z L 805 6-Plate Sleeve Clutch

●

Write for Bulletin 345 and new price lists.

THE CONWAY CLUTCH CO.

1541 QUEEN CITY AVE.
CINCINNATI 14, OHIO

duction, where the work piece rests on the muffle floor. The chief heat transfer, however, is by radiation from the walls of the muffle.

Semi-muffle type furnaces, Fig. 2 are usually those with muffle sections which do not completely enclose the working chamber. One of this type might have a U shaped hearth with the side walls extending well up into the heating chamber. Any products of combustion that impinge on these sidewalls are directed away from the work and out thru the exhaust ports. Should the exhaust design be too small some of the products of combustion could be deflected onto the work and the furnace would be of no more value than a convection type of unit. Such a condition would occur only in a unit of poor design or one in which the exhausting means had been altered or otherwise rearranged.

In most cases, this type of equipment is fuel fired with gas, either manufactured or natural. Burners are mostly of the pressure type being supplied from a compressed air or a blower system. Burners have means for adjustment of the fuel-air ratio both for the purpose of attaining high temperature and also to modify the oxygen content of the work chamber. Reduction of this oxygen content improves the quality of the work being hardened by reducing the scaling of the work during the heating cycle.

Similar furnaces are manufactured with electrical heating elements. These are of the resistance type with the heating element being either of wire, ribbon or tubular metallic units or of a rod shaped resistance material made of silicon carbide such as is known here and abroad as a Globar. Metallic resistance units are seldom used in equipment designed for operation at temperatures in excess of 2200°F. since the

Through the years, "economy" has often been the byword on the road to success, and mechanically speaking, IT STILL IS when applied to . . . . .

TOOLS E PRECISION MADE

DRILL JIG BUSHINGS

or

GAGES . . that

bear the popular trade-mark of dependability

Write today for particulars

ECONOMY TOOL & MACHINE CO.

MILWAUKEE 14, WISCONSIN

MULTI-DUTY

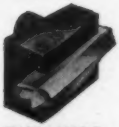
MODERN LATHE TOOLING

BORING

DRILLING

PARTING

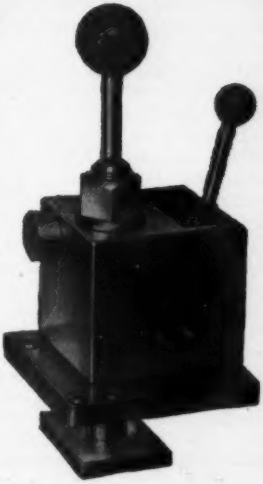
TURNING



TURNING

SAVES!
MAN HOURS
TOOL BITS

Turn and bore correctly. Mounts up to 7/8" Tool bits and 2 1/2" Boring Bar.



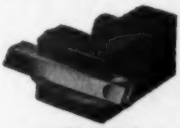
- **ACCURACY.** Guaranteed repeat performance to .0002.
- **ADAPTABILITY.** Unlimited number of operations in one chucking. Doubles lathe usefulness.
- **RIGIDITY.** Positive location for cemented carbide tools. No spring. No chatter.
- **SPEED.** Change operations in 2 seconds. Save up to 40% lathe time.

BENCH TO HEAVY DUTY

Send for descriptive literature.

Some dealer territory available!

KNURLING



FACING

MULTI - DUTY FRY **TOOL - HOLDER**

AIRO PRODUCTS COMPANY

2709 WEST 54th STREET • LOS ANGELES, CALIFORNIA

life of the heating elements at such high temperatures is relatively short. Most manufacturers of this type of equipment design their units for operating temperatures ranging between 1600°F. and 1800°F. with some specifying operating temperatures up to 2000°F.

Since turbulence of combusted gases in the work chamber is not encountered, the heating element may be so designed and located as to radiate heat to the bottom and sides of the hearth piece or muffle. In this way, heat may be readily applied evenly thruout the entire hearth area. In all furnaces there is a tendency for the section of the chamber nearest the door to be cooler than the interior. It is difficult to overcome this tendency in fuel fired equipment. With electrically heated equipment the problem is relatively easy to solve. Some furnace manufacturers install heating elements on the inside face of the door itself. These operate when the door is closed radiating heat into the throat between the door face and the work chamber to offset the cooling effect of the door opening. One manufacturer has evolved a unique solution by designing a heavily insulated door which is installed within the furnace shell. When closed, this door forms the front wall of the heating chamber. Effective heat seals around the door and the extra insulation in the door itself combine to eliminate any need for a heating element in the door especially since the usual throat construction is replaced. Such construction also makes the work chamber more accessible to the operator.

The hardening of the high speed types of steels require temperatures ranging from 2200°F. to 2400°F. For these types of steel, furnaces designed for operating temperatures up to a maximum of 2500°F. are the accepted standard. As previously explained, metallic heating

Modern drives require *modern* couplings

LOVEJOY L-R FLEXIBLE COUPLINGS

Efficiently solve transmission problems with least servicing.

MISALIGNMENT causes rapid wear, stiff operation and noisy drives. Lovejoy L-R Couplings positively correct for misalignment—take up shock and vibration—adjust instantly for reversing loads, pulsating loads, oscillation and backlash—insure **quiet.**

Send for complete Catalog and Selector Charts

See for yourself how scientifically and simply these improvements are embodied in Lovejoy. Resilient Alignment construction. Rugged. Compact. Long-lived. **Corrosion resistant.** Non-lubricated. Types and sizes for every kind of duty from 1/6 to 2500 h.p. (Type "A" 1/6 to 50 h.p. shown).

LOVEJOY FLEXIBLE COUPLING COMPANY
5026 W. Lake Street, Chicago 44, Ill.

Also manufacturers of
Lovejoy-IDEAL Variable Speed Transmissions

WITH A

Mall

REG. U.S. PAT. OFF.

PORTABLE ELECTRIC SCREWDRIVER

Capacity ¼" hex bit up to No. 10 flat or No. 12 round head screws

You can standardize your screw-driving operations, speed up assembly and save real money with this powerful Mall Screwdriver. It is light in weight, (only 3 pounds without cord), compact in design and streamlined with pistol grip and trigger switch for easy, one-hand use. Adjustable, single slip clutch, that assures predetermined, uniform screw tightness, slips automatically when correct screw tension is reached eliminating stripped threads and broken studs. Clutch tension is quickly and easily adjusted, commutator cleaned and brushes replaced without dismantling the screwdriver. It is ruggedly built with die cast aluminum housing, extra long brushes, hardened alloy steel gears, and self lubricating bearings that make for long life and smooth operation. Available in two voltages—110-volt AC-DC or 220-volt AC-DC, 25 to 60 cycles.

Ask your Supplier or write POWER TOOL DIVISION for literature and prices.

MALL TOOL COMPANY

7742 South Chicago Avenue **Chicago 19, Illinois**

★ *25 Years of "Better Tools For Better Work"*

ARTUS PLASTIC SHIM

AND

FEELER GAUGE STOCK

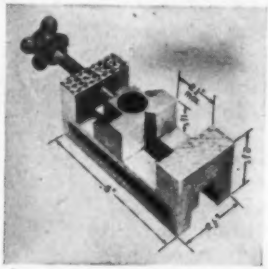
The COLOR tells the THICKNESS

• Long lasting plastic, replaces scarce metal. Each thickness a distinctive, easy to identify color. Impervious to oil. 5"x20" sheets. Special sizes to order. Handy assortment, shim stock, 12 colors—12 thicknesses (.001-.030). Bound together.. $4.25

Order today. *Immediate delivery.*

INDUSTRIAL PRODUCTS SUPPLIERS
106 Water St., Dept. H, New York 5, N.Y.

PRECISION TOOLMAKER'S VISE



HARDENED AND ACCURATELY GROUND MACHINE STEEL

Adjustment for Maintaining 100% Accuracy to Sliding Jaw Indefinitely

Slotted for Clamping to Table

PRICE $30.00 F.O.B. CHICAGO, ILL.

C. B. TEETER
Machine Specialties
4470 Oakenwald Ave., Chicago 15, Ill.
Phone Drexel 3571

elements are not suitable for high temperature service and Globars are universally used as heating elements.

High speed steel hardening furnaces are of two types. Prior to World War II the semi-muffle type was the more common. With the exception of the heating element arrangement this type of unit was similar to the 1600°F. to 1800°F. box type metallic heating element furnace. Hearths are made either of heat resisting alloys or of silicon carbide. At the extremely high operating temperatures encountered silicon carbide hearths are to be preferred for longer and more satisfactory service life.

While the semi-muffle types of high speed steel hardening furnaces are often equipped with gas curtains to burn off some of the oxygen in the air when the furnace door is opened, they are rarely equipped for complete controlled atmosphere operation. Moisture, the carbon oxides, sulphur gases and other products resulting from combustion of atmosphere generating compounds are especially harmful to heating elements causing very material reduction in their useful life. Even the use of gas curtains reduces heating element life to the point where special transformer equipment must be installed to compensate for rapidly increased resistance of the elements.

Without any protective atmosphere present, tools will be considerably scaled and decarburized. Gas curtains only partially prevent this scaling and decarburizing. Where it is desirable to prevent both of these conditions, it is necessary to use furnaces equipped with special generating apparatus or units provided with other means of producing an atmosphere that will prevent the occurrence of either or both scaling and decarburization. For heating element and furnace heating chamber protection from the gases used, the furnace must be of the full muffle type. That means

that the furnace is equipped with a chamber within the furnace heating chamber where the work to be heated can be enveloped by the protective gas and yet that gas cannot come into contact with other hot furnace parts.

Basically the full muffle furnace, Fig. 3, is similar to the semi-muffle type with the exception of the muffle chamber itself. Since the muffle is enclosed, heating elements can often be rearranged for more efficient heating. Practically all of the later installations of high speed steel hardening equipment are of the full muffle type furnace since it is now recognized that considerable and expensive man-hours must be consumed in refinishing tools that have been badly scaled and deeply decarburized.

At the present time preference is about evenly divided between gas fired and electric furnaces. Fuel costs as against power costs are prime factors in making a decision. However, furnace users are finding that many advantages are to be gained by installing electric equipment.

Some of these outweigh any advantage of low cost gas. Electric units are capable of a wider range of operating temperatures under closely regulated conditions. Other advantages to be found in electric furnaces include relative external coolness, making for operator comfort—quietness of operation—cleanliness and absence of exhaust fumes and combusted gases, eliminating the need for ventilating systems and permitting the placing of electric furnaces in any desired location. Many installations are made in tool rooms or tool cribs where fumes, excessive heat and noise would prove objectionable.

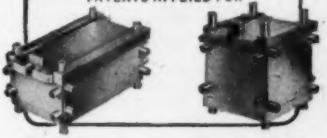
This article has been confined to a general discussion of tool and production part heat treating furnaces. No attempt has been made to cover the field of special application units of which

NEW Drillet
JIG BOX
CUTS DRILL JIG COSTS 75%

DOES AWAY WITH SPECIAL TOOL DESIGN OF THE JIG BODY

Casting Machined by using standard Drillet Jig Box

BUILT IN STANDARD SIZES AND SHAPES UP TO 6" x 6" x 6"
PATENTS APPLIED FOR



The Drillet Jig Box is a six sided leaf type jig for all phases of drill press operation. Tooling expense can be reduced as much as 75%. All that is necessary is for toolmaker to locate part and insert drill bushings. Eliminates preliminary steps required in building and squaring jig. Side plates, end plates and leaves are replaceable for immediate delivery. Before investing hundreds of dollars in your toolmaker's time —Write for Literature and Prices.

Full Scale Tracing Templates with Orders on Request.

CHICAGO
DRILLET CORPORATION
1735 N. Winchester Ave., Chicago 22, Ill

there are almost an infinite variety.

PROTECTIVE ATMOSPHERE

Since even the best furnace will not produce quality hardening of high alloy steels unless some sort of a protective atmosphere is introduced, it would seem that a brief description of some atmospheres should properly be included. The subject of Protective Atmosphere is one of great contention. Considerable study and development work is currently being carried on with new theories being advanced frequently.

It is generally recognized, however, that the prime element in a protective atmosphere for most steels, is Carbon Monoxide. It is also recognized that the especially harmful gases are Carbon Dioxide and Hydrogen when either exists in any appreciable amount. Most of the current work on atmosphere has been aimed at an increase in Carbon Monoxide content and a reduction or elimination of Carbon Dioxide and Hydrogen. It goes without saying that no protective atmosphere should contain free oxygen.

The proper type of protective atmosphere to be used is determined by the requirements of the steel to be heat treated and the finish specifications of the tool or part itself. For high speed steel work, the more desirable atmosphere is one that will completely prevent scale and decarburization on any of the several types of high speed steel

• • •

Fig. 3. A typical tool-room installation showing three full-muffle electric high speed steel hardening furnaces and one small, gas fired semi-muffle furnace. Automatic temperature control equipment on wall maintains desired temperatures in electric furnaces.

BOYAR-SCHULTZ NO. 618 PRECISION SURFACE GRINDER

A Machine Tool designed to give the fine finish and high degree of accuracy necessary in the finest of gage grinding and tool and die making.

It is built with a sturdy ruggedness that maintains that fine accuracy for a long period of time . . . much longer than most similar tools are expected to last.

Such long lasting precision performance gives the inevitable result of greater economy.

Protect Your Tool Dollar with the Finest

BOYAR-SCHULTZ CORPORATION

2108 Walnut Street — Chicago 12, Illinois

in general use. Some atmospheres will protect one type of steel and not another, while others will protect all types equally well.

Tool coating compounds have been frequently used to prevent scale or decarburization. In effect, these coatings applied to the tool surface seal that surface from possibility of contact with any of the gases that might cause scale or decarburization during the heating cycle. Some coating compounds are more effective than others. All of them cause excessive deterioration of furnaces and linings and high temperature furnace manufacturers do not approve of their use. Removal of these coatings after hardening is often difficult, especially on tools with fine threads. Usually coatings are only used when nothing else is available and scale and decarburization must be prevented.

Protective atmospheres are generated in several ways. Perhaps the most common means is the Gas Curtain previously referred to. This is merely a curtain of flame or combusted gas which burns across the door opening whenever the furnace door is raised. Some of the oxygen in the air is burned out before it can enter the furnace chamber. While Gas Curtain flames can be adjusted as to air and gas ratio, their action is only partially effective on most high alloy steels.

The introduction of burnt or partially burnt gases directly into the furnace or muffle chamber is a somewhat more effective method of providing a protective atmosphere. Mixtures can be better controlled with this method, but harmful gases are still present and cannot be eliminated.

In order to provide the high percentage of Carbon Monoxide necessary to prevent scaling or decarburizing, special generating apparatus must be employed. One type burns charcoal in restricted air and after cleaning and drying, sends the products of this combustion into the furnace muffle under pressure. Another type adds the products of combusted gas to the charcoal combustion.

A generator of more recent development makes use of recirculation and regeneration to enrich the Carbon Monoxide content of combusted gas and at the same time, to reduce the Carbon Dioxide, Moisture and Hydrogen content. All generators require considerable service attention and adjustment and generated atmospheres are subject to variation from many causes during operation.

The use of a patented carbonaceous secondary muffle inside the furnace muffle chamber is a method of providing suitable protective atmosphere that has become widely adopted. This secondary carbonaceous muffle, known to the trade as a Sentry Diamond Block, gradually combines with the oxygen of the air entering the chamber to produce an atmosphere high in Carbon Monoxide content and practically free of other gases which would cause soft

REAL
MONEY-SAVING
CONVERSION

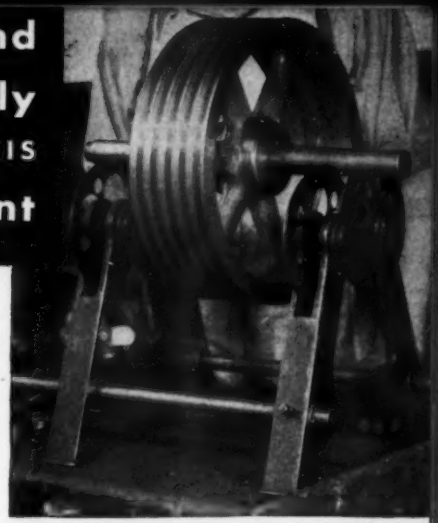
Turn Bench or Engine Lathe Into a TURRET LATHE

Convert up to 24" swing . . for forming, roughing, boring, drilling, tapping, finishing etc. No need to stop lathe or change tools.

WRITE FOR
MACHINE TOOL CATALOG

JEFFERSON MACHINE TOOL CO., 700 W. Fourth St., Cincinnati 3, Ohio

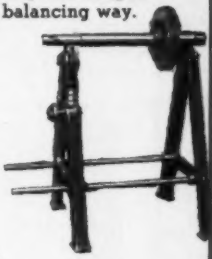
Check Balance and Runout Accurately WITH THIS undstrand Equipment



Illustrated are a few of our complete line of balancing tools and bench centers. If you need modern, accurate equipment for checking balance and runout, investigate this line today.

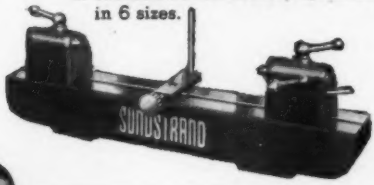
1. Extra heavy duty type balancing ways—floor and pit type.

4. Checking vee-belt pulleys with super-sensitive bench type balancing way.



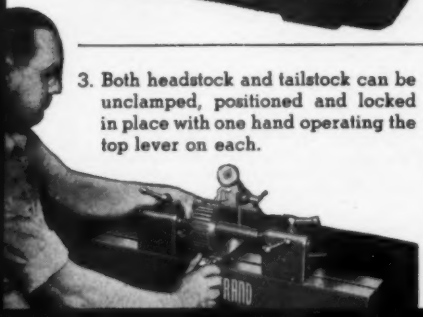
5. Adjustable floor type balancing way. Floor types furnished in 4 different models.

2. Modern bench center, available in 6 sizes.



GET COMPLETE DETAILS IN THESE FREE BOOKLETS

Complete specifications and features are covered in this literature. Ask for bulletin 458.



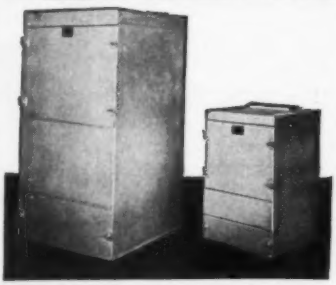
3. Both headstock and tailstock can be unclamped, positioned and locked in place with one hand operating the top lever on each.

SUNDSTRAND
MACHINE TOOL COMPANY
2535 Eleventh St. Rockford, Ill., U. S. A.

surface or scaling. Since the generation of the atmosphere is dependent solely on the operating temperature, the chemical analysis of the atmosphere will not vary at a given temperature. Use of the Diamond Block Method is confined to the alloy tool steels hardening above 1700°F., since below that temperature the atmosphere is not sufficiently rich in Carbon Monoxide content to prevent decarburization, altho scaling will not occur. One outstanding advantage is the elimination of all mechanical generating equipment with its attendant need for constant regulation, and freedom from atmosphere leaks. For the small or medium sized tool shop such a means of providing the necessary surface protection to tools and dies during heat treatment is especially desirable, both from the point of view of first cost and that of economy of operation.

In making any selection of equipment for hardening purposes, full consideration should be given to just what type of work is to be handled. Range of desired operating temperature, fuel or power supply available, general range of sizes of work to be handled, average amount of work volume, need for protective atmosphere, means of exhausting dangerous fumes are all factors of major consideration, as well as first cost and operating cost. Under today's plant conditions, other conditions such as operator's ease and comfort of operation, plant cleanliness and such are becoming more and more deciding factors where other conditions are equal.

Most equipment manufacturers are staffed with engineers competent to make recommendations as to equipment most suitable for the purpose and they will welcome the opportunity to make such recommendations. After a decision has been made and the equipment installed, the manufacturer or his agent should be called in for demonstration and instruction in proper operation and maintenance. With proper equipment properly operated, hardening failures can be largely eliminated and tool and die quality will be materially improved.



TORNADO DUST COLLECTORS
for Efficient Dust Collection

WITH its fifteen filter tubes, large filter surface, the TORNADO Dust Collector collects finest dusts, or large, heavy particles. Compact. Easily attached to grinding, buffing and polishing units.

Write for details.

BREUER ELECTRIC MFG. CO.
5118 N. RAVENSWOOD AVE.
CHICAGO 40, ILL.

SPRAYWELDING

A new spraywelder is described and illustrated in a four-page bulletin issued by the Way Calmonoy Corp., Dept. BB, 7th floor Fisher Bldg., Detroit 2, Mich. This is known as the Colmonoy Spraywelder.

The manufacturers report that this process combines the advantages of welding and metallizing practice. The area to be overlaid is grit-blasted, or if harder than 28 Rockwell C, is prepared by the "Metco Fusebond Process." Then the overlay of Colmonoy is applied by the Spraywelder to the desired thickness. Then it is fused to the base metal by any one of the following methods:

1—Oxy-acetylene equipment.

2—Induction equipment.

3—Controlled atmosphere furnace.

The various properties and advantages of this process are pointed out in the bulletin.

Unretouched View

ARMOR MACHINE TOOLS

$195.00

AT FACTORY
Accessories Extra

ACCESSORIES:

Power Feed
Lever Feed
Floor Stand
Arbor Yoke
Coolant Pan
Coolant Units
Belt Guards
Lathe Rests
Vertical Attachment
Arbors
Swivel Vise
Dividing Heads
Collets
Back Gears

TRAVEL:

12" Long
10" Vertical
7" Cross

ARMOR Model AT shown complete with all accessories, making it a model JM. Model AT (add to it series) is a standard horizontal milling machine less motor and mount. The buyer can make his own accessories or purchase from factory finished or raw castings. Both models have ground lead screws and hand scraped ways. Weigh 700 pounds with floor stand. Can use 1 h.p. motor. Deliveries from stock.

Write for Bulletin BB.

AIRCRAFT MACHINERY CORPORATION
BURBANK, CALIFORNIA

The Significance Of Current Trends In Prices, Wages and Productivity

by
Ewan Clague

Commissioner of Labor Statistics, Bureau of Labor Statistics, Department of Labor.

The following is the text of an address made by Mr. Clague in January, 1947 before a Business Problem School sponsored jointly by the Chicago Association of Commerce and Industry and the Chicago Chapter of the American Statistical Association.

In the opening paragraphs of his speech Mr. Clague traced the work of the Bureau of Labor Statistics. He then discussed wholesale prices and compared commodity prices after World War I with World War II. Believing that our readers are primarily interested in wages, consumer prices in relation to wages, and in production, we are omitting the first parts of Mr. Clague's speech so that we may reprint, in its entirety, that portion of his speech which deals with wages, consumer prices and production.

The Bureau obtains regular monthly data regarding earnings and hours from approximately 30,000 establishments in 154 manufacturing industries. This sample is so devised that the results can be considered representative of all workers in the country in the various industries. Let us look at our estimates of average weekly earnings for production workers in all manufacturing during the war and postwar period.

In August 1939, just before the start of war in Europe, American factory workers were averaging $23.77 a week. The average rose slowly until the middle of 1940, reaching $24.89 in June of that year. By that time our preparations for war had begun and substantial war orders for Britain were being filled; thereafter average weekly earnings in manufacturing began to increase rapidly, advancing to a high point of $47.50 in January 1945. Earnings declined slightly after VE-Day as a result of a slight decline in hours, then fell sharply in August 1945 after the Japanese surrender. A low of $40.58 was reached in February 1946. Increases in hourly earnings since then brought average weekly earnings up to $45.68 in October 1946. "Take-home" pay was somewhat smaller due to various deductions.

The change in earnings by the middle of 1940 was less than five per cent, but by the Spring of 1943 the index was about 80 per cent higher. Increases after that were at a slower rate and the whole movement culminated in January 1945 at a point just twice as high as

How does the worker's wages in 1946 compare with his wages in 1935-1938? What is his "real" or actual purchasing power today in terms of present prices? What has happened to the average output per man-hour in manufacturing in the last 20 years? Based on previous experience with prices, wages and productivity, what may be expected from the future?

the August 1939 level. The decline after that date brought the index down to 171 in February 1946. Subsequent increases in earnings raised the level to 193 in October.

FACTORS INFLUENCING EARNINGS

Now, what were the underlying factors which influenced the movements of weekly earnings? During the period we are discussing, average hours worked per week in manufacturing increased from approximately 38 in August 1939 to around 45 between the early part of 1943 and the early part of 1945. Most of the rise in hours meant not only added straight-time, but also premium pay. The rise in hours was, therefore, an important factor in the increase in average weekly earnings. The other important factor, the increase in average straight-time hourly earnings, was influenced by a number of things. First was the increase in basic wage rates permitted under the Little Steel Formula during the period of wartime control. A second reason for the increase in the general average of straight-time hourly earnings was the great increase in employment in such high wage industries as shipbuilding and aircraft. A further reason was the additional compensation for individual merit, length of service, remedying of substandard wages, and the caring for "rare and unusual cases" where necessary workers had to be retained. The result was that straight-time hourly earnings in manufacturing increased from 61.3 cents in August 1939 to 97.0 cents in January 1945.

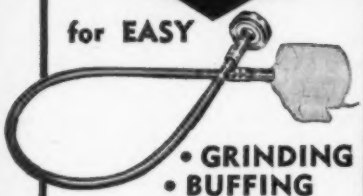
The story of the decline in earnings from the wartime peak to early 1946 is largely the story of a number of these factors working in reverse. Hours of work and the amount of premium pay declined, and workers let out of high-paying war manufacturing jobs had to take less remunerative work. Yet since the early part of 1946, hours have remained fairly stable at about 40 per week, while straight-time hourly earning have increased about 13 per cent. As a result, both gross hourly and weekly earnings have increased in about the same proportion since early 1946.

Now let us look at what happened to weekly earnings in the first World War. To begin with, wages were at a much lower level. In fact, it was not until the postwar peak that money earnings were higher than they were at the beginning of World War II. In July 1914, just before World War I started in Europe, weekly earnings in manufacturing averaged only $11.06. In 1916, they began to rise rapidly and by the time of the Armistice the average was $20.94. Following a short recession immediately after the Armistice, earnings rose to a high of $26.98 in August 1920. The 1921 depression caused a decline to $20.38 in November, after which there was a rise, but not to the earlier postwar peak.

There were important differences in

Attach this
FLEXIBLE TOOL-SHAFT
to any available
motor

for EASY



• GRINDING
• BUFFING
• DRILLING
• POLISHING
• SANDING

The STOW Flexible Tool-Shaft, in combination with the proper attachments, will perform all the operations so important to shop mechanics and maintenance men, plus many miscellaneous jobs. It expands the applications of power hand-tools also . . . quickly, easily, and economically.

Every shop should have at least one of these STOW Flexible Tool-Shafts. Its ample length and portability makes it ideal for reaching those out-of-the-way, hard-to-get-at places, and it is simple to connect and disconnect.

Adaptable to portable power units, either electric or gasoline, and to stationary power plants. Write for full details today, or see your mill supplies or hardware dealer!

Here's Real Value For (5 Ft. Model) A Price All Can Afford!

$15

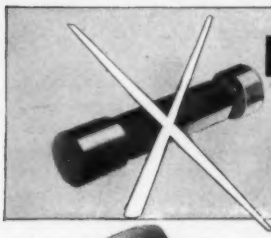
6 FT. MODEL $16.50

STOW MANUFACTURING CO.
30 Shear St., Binghamton, N. Y.

the conditions affecting weekly earnings in the two periods. With no price control until near the end of the first war, and little control over wages, weekly earnings at the time of the Armistice were practically double the pre-war level. This happened in spite of little change in hours and virtually no premium pay for overtime. Weekly hours averaged only 46.3 in 1919 as compared with 49.4 in 1914. This, of course, means that average hourly earnings increased even faster than average weekly earning. Now, in World War II, weekly earnings doubled only after 5½ years of war, even with a sharp rise in hours and premium pay and the much greater shift to high-wage war industries. The index of weekly earnings rose an additional 20 per cent from October 1918 to June 1920, but in the 14 months since July 1945 the average first fell sharply and then rose by November 1946 to approximately the level of July 1945. Nor does it seem likely that the present upward trend will come near the peak of the first war, in terms of per cent of increase.

EARNINGS RELATED TO PRICES

No discussion of earnings is complete without some consideration of what money earnings can buy, or so-called "real" earnings. That means that we should look at changes in prices, at least in the prices of things that workers must purchase. Our consumers' price index measures average changes in retail prices of selected goods, rents, and services, bought by families of wage earners and other moderate-income workers. Let us look at the change in this index since July 1914, on the basis that the average of prices in the period 1935-39 is 100. After the first spurt in prices between January 1941 and the Spring of 1942, prices remained fairly stable, rising rather slowly until the sharp upturn last Summer. And then, of course, we see a rise of 15 per cent



DuBo Gages are going over!

Orders and re-orders demonstrate DuBo superiority over cylindrical plug gages

STANDARD

DuBo* Plug Gage

checks bores FASTER, more accurately!

SINGLE END
Sizes 1.510" to 6.010"
(38 mm. to 152 mm.)

DOUBLE END
Sizes .240" to 1.510"
(6 mm. to 38 mm.)

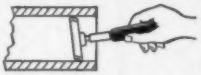
Enthusiastic users all over the country are rapidly replacing cylindrical plug gages with DuBo Gages. The first use unmistakably demonstrates DuBo superiority — its extreme lightness, its ability to detect dimensional deviations (taper and out-of-roundness), its ease, speed and accuracy. STANDARD representatives in leading industrial centers will gladly arrange a demonstration for YOU.

WRITE FOR BULLETIN *Patents Pending

LIGHT IN WEIGHT

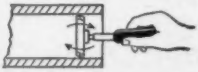
DuBo Gages weigh 70% to 80% less than cylindrical plug gages of equivalent size. Lighter weight means less fatigue, greater accuracy.

EASY TO ENTER



DuBo is entered easily by tipping handle slightly above bore axis (no jockeying necessary). Enters even under-sized bores easily.

DEFINITE CHECK



Enter gage, rock handle gently, bringing spherical gaging surface in contact with bore wall. Whether or not handle drops freely below center, is definite yes-or-no answer.

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

Here is an *Improved Way* to . . .

Handle Materials and Position Work

LYON-Raymond

Hydraulic

HIGH-LIFT TRUCK

Modern welded tube and formed plate construction, designed for strength, rigidity and safety. Weighs only half as much as an ordinary tiering truck of comparable capacity.

1. LIFTS AND TRANSPORTS
Will pick up a skid load as handily as the usual type of lift truck. Easily transports capacity loads and can be steered into any space accommodating its width.

2. SUPPORTS
An adjustable support for overhanging work on drill presses, shears, cut-off machines, punch presses, etc. Serves also as a feed table for many operations. Secure floor lock.

3. LEVELS
Exact leveling for changing dies in presses. Ideal for transporting heavy die sets, fixtures and tools to and from storage bins.

4. POSITIONS
Adaptable to positioning work in lathes, loading and unloading heavy work from other machine tools. Quicker and safer than with a helper and chain hoist.

5. LOADS AND UNLOADS
One man can do the work of many in loading and unloading freight. Especially convenient where shipments are delivered to curb or where docks are not available. Hydraulic operation assures ease and safety.

6. TIERS
An easily maneuvered truck, adaptable to tiering. Among other uses it serves as an adjustable work table for machining, assembly and general toolroom work.

PROMPT SHIPMENT
Write for
BULLETIN 240

LYON-Raymond Corporation
567 Madison St., Greene, N. Y.

between May and November, somewhat more than the increase from May 1942 to May 1946.

In the First World War we did not have the checks to price increases which existed in World War II during the period of effective control. Instead there was a continuing sharp upward trend followed by a sudden downturn. While present prices to consumers are as high as the peak of the first war, we must remember that we entered this past war at a much higher level of prices. While the peak of consumers' prices in June 1920 was 108 per cent higher than the July 1914 level, the November 1946 index was only 54 per cent above August 1939.

If we deflate the $47.50 that the average factory workers earned in January 1945 by the price index at that date, we arrive at $37.37 in terms of 1935-39 dollars. Similarly the $45.83 in October 1946 was worth only $30.88 in 1935-39 dollars. Estimates such as these in dollars and cents have a meaning more readily apparent when reduced to index form. In January 1945, when money earnings were double the level of August 1939, real earnings had increased by only 55 per cent. By October 1946, when money earnings were 93 per cent above August 1939, real earnings were only 28 per cent above that level. The drop in real earnings was caused mainly in the late war and immediate postwar period by the drop in money earnings. After the middle of 1946, real earnings declined because of the recent sharp rise in prices.

During the first war, the change in the workers' real position was not as favorable as in the second war in spite of a more rapid increase in weekly earnings. This was because of a still more rapid increase in prices. The striking and significant fact about prices and weekly earnings in World War I is that they both rose sharply together. Real weekly earnings of workers from 1914

thru 1920 except for a few months) did not rise as much as 20 per cent. During the depression of 1921, real weekly earnings declined almost to the pre-war level, but recovered by 1923 to approximately 20 per cent above 1914.

In World War II factory real weekly earnings increased as much as 55 per cent at the peak, and today are about 25 per cent above the pre-war level.

A final observation should be made regarding the long-term upward trend of real earnings. It is related significantly to the rise in productivity as measured by man-hour output.

MAN-HOUR PRODUCTIVITY

It is an interesting and significant fact that when economists get down to brass tacks in discussing long-run trends of wages or prices, or when labor and management meet around the table to negotiate new contracts, their thinking turns sooner or later to productivity. The term may be applied to the relation between production and virtually any desired factor of input. Thus we may speak of output per unit of capital equipment, per ton of coal used, per man-hour of labor, or any other factor. My use of the term today will be limited to output per man-hour of labor.

In our recent history, average output per man-hour in manufacturing industries has tended to double every 20 years. This represents an average annual increase of 3¼ per cent. In 1939, output per man-hour was more than one and one-half times as large as in 1909, 30 years earlier. Labor productivity in the mining industry has increased at an annual rate of about three per cent over a long period, striking progress in view of the increasing resort to lower-grade and less accessible resources. Altho figures are less definite for agriculture, they indicate conclusively that here, too, productivity has greatly increased.

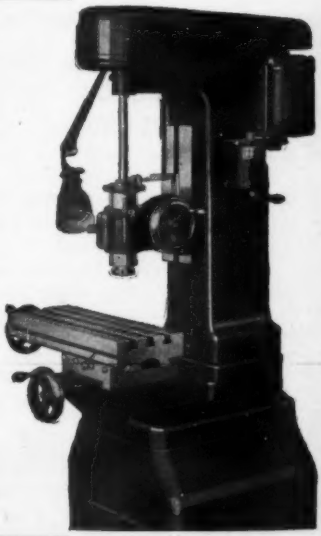
SAVES *TIME . . . MONEY*
IN BUSY TOOL ROOMS

Eight velvet-smooth spindle speeds to 4250 r.p.m., rapid setup and quick changeover give the Linley Miller and Jig Borer versatility on a wide variety of work on small dies, jigs, fixtures, patterns and models. Reduces toolroom costs by saving larger machines for their higher rated capacities.

Direct micrometer setting assures maximum accuracy . . . no backlash in quill travel. Fits in 2½ sq. ft. area and has ample 7" x 17½" table size.

Investigate this time and money saver . . now.

Bulletin gives details.



LINLEY BROTHERS COMPANY
663 STATE ST. EXT.
BRIDGEPORT 1, CONN.

The figures just cited refer to trends during a normal peacetime period. What happens to productivity in a wartime period such as we have recently experienced is much more difficult to describe. The products of our industrial machine were radically changed, with extreme increases in productivity in the manufacture of such things as aircraft and ships. In industries producing civilian goods, levels of output per man-hour in general underwent little wartime change and thus these industries failed to maintain the average peacetime increase in man-hour output. Now, with the overcoming of wartime and reconversion difficulties, these industries are showing rapid increases in productivity. In a group of 20 manufacturing industries for which data are available, mostly industries producing nondurable goods and comparatively free from reconversion problems, average output per man-hour in the third quarter of 1946 had already increased four to five per cent over the previous year. It is possible that 1947 and succeeding years may show even greater gains. After World War I the trend of man-hour out put turned sharply upward for a considerable period.

Most of the underlying factors affecting productivity seem to favor a steady and substantial rise in productivity in the next few years. Assuming that this occurs, we will be faced with a sobering responsibility. A steady increase in productivity is the main economic basis of our rising standard of living. Productivity is thus a promise of continuing improvement in the form of more and better goods and services. We must not forget, however, as has been our tendency at times in the past, that rising productivity is a threat as well as a promise. If more goods are produced per hour of labor, it is equally true that less labor is required per unit of output;

MORE SPEED MORE SUPPORT MORE WORK

CUTS COST OF SAW-BLADE REPLACEMENTS

Paddock Ball-Bearing Band Saw Guides will more than pay for themselves in a very short time by (1) Saving on Blade Breakage, (2) Speeding up production, (3) Cutting any materials at any speed, and (4) Protecting workmen. The whole secret of Paddock Efficiency: **Interchangeable ball-bearing wheels running with the blade give strong yet friction-free support.** Sold on ten days FREE TRIAL. They make any band-saw, old or new, work better! Write for circular and prices.

PADDOCK TOOL COMPANY
1418 Walnut Street, Kansas City 6, Mo.
Guide Makers Since 1920

Paddock
BALL-BEARING
BAND SAW GUIDES

Brightboy

the SOFT RUBBER BINDER CUSHIONS *the Abrasive*

Precision, Close-Tolerance
BURRING–FINISHING
CLEANING – POLISHING

All in One Operation

Bridges the gap between the grind and buff. No preparation required — works on all metals and plastics with substantial savings in time and labor.

Brightboy Standard
•
Brightboy Fine-Tex
•
Brightboy Tuff-Tex

Ask your regular dealer for Brightboy Catalog or write us to have a Brightboy technician call to recommend operation short cuts.

WELDON ROBERTS
Brightboy

BRIGHTBOY INDUSTRIAL DIVISION
Weldon Roberts Rubber Co.
Newark 7, N. J.

CERROSAFE

Makes Wood Patterns and Core Boxes LAST LONGER

Cerrosafe, melting range—160°-190° F. can be sprayed on wood patterns and core boxes by means of an electrically heated spray-gun*. This coating resists moisture, wear and prevents warpage. Simplifies alteration of patterns.

Cerrosafe, when cast or sprayed, reproduces fine detail. Used for making duplicate patterns and as master models for engraving machines with low stylus pressures.

**Spray gun information sent on request.*

OTHER LOW-TEMPERATURE-MELTING ALLOYS

Cerrobase	Melting Temp. 255° F.
Cerrobend	Melting Temp. 158° F.
Cerromatrix	Melting Range 217° F. —440° F.
Cerrotru	Melting Temp. 281° F.
Cerrolow—117	Melting Temp. 117° F.
Cerrolow—136	Melting Temp. 117° F.
Cerrolow—147	Melting Temp. 117° F.
Cerrolow—136	Melting Temp. 136°F.
Cerroseal	Melting Temp. 255°F.

Write for name of nearest distributor.

CERRO DE PASCO COPPER CORPORATION

40 Wall St.

New York 5, New York

and unless we utilize our entire labor force by producing more, we shall again fall into the bogs of unemployment.

REFLECTIONS ON THE FUTURE

In concluding, I should like to comment briefly on the current widespread discussion of what is going to happen to business this year and in the long run. It is not my purpose to add to the forecasts but only to make a few remarks on basic conditions and factors at the present time as compared with the period following World War I. Reflections of this nature may throw light, not so much on what will happen as on the possibility of decisions and actions that will tend to give desired direction to the course of our economy.

I have already discussed the trends of prices, wages, and productivity during the two periods. I would like now merely to call special attention to a few comparisons. For example, the extreme instability of prices that culminated in the depression of 1920 to 1922 has so far been avoided. Wholesale prices rose one and one-half times above the low point of 1914 by May 1920, and these peak prices were almost cut in half in the following year and a half. There is good reason to expect that, in spite of recent price instability our economy will currently be spared such extreme shocks.

But price stability is not an end in itself; price trends should be evaluated in the light of other changes, such as the trends of productivity, income, and purchasing power. Both wholesale prices and consumers' prices in the fatal summer of 1929 were at substantially the same levels as in the summer of 1923 after postwar stabilization; in contrast, between 1923 and 1929, productivity rose rapidly. The estimated increase for mining is 18 per cent; for railroads, 19 per cent; and for all manufacturing, 32 per cent. Stated in another way, unit costs were falling; the labor required per unit in manufacturing was 24 per

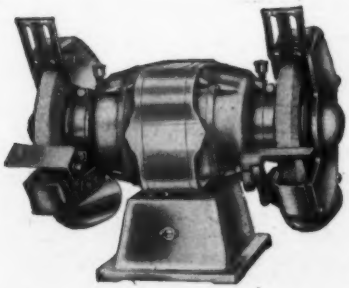
Special CARBIDE TOOL GRINDER

FOR QUICKLY AND ACCURATELY SHARPENING CARBIDE TOOLS

BALDOR GRINDER, series 500, (shown above) is the newest development in grinders designed and fully equipped for sharpening Carbide Tools quickly and accurately; has sturdy ½ H.P., reversible, ball-bearing motor. 6" Silicon Carbide wheels; adjustable tool-rest tables, water pot. Complete as illustrated and GUARANTEED 2 YEARS against burn-out.

Reasonably Prompt Shipment

ASK FOR BALDOR BULLETIN 321B ON COMPLETE LINE

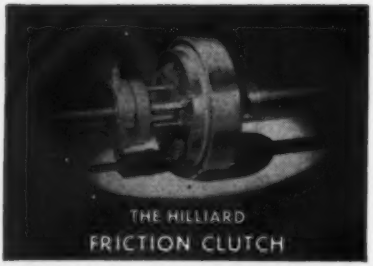


AT LEFT: BALDOR Bench Grinder, No. 101. 1½ H.P., ball-bearing motor; 1725 rpm; 10" Aloxite wheels; adjustable tool rests.

BALDOR ELECTRIC COMPANY
4368 Duncan Ave., ST. LOUIS 10, MO.

District Offices in Principal Cities

BALDOR
BALL BEARING **GRINDERS**



Hilliard Friction Clutches and Couplings are especially suitable for drives requiring smooth clutching and infrequent clutch adjustment. Their rack and gear mechanism permits very slow engagement of friction surfaces, resulting in extremely smooth load acceleration, always under control.

A reliable series of spring-loaded slip clutches and couplings made in a variety of types. Outstanding for—reeling and winding operations—tension drag brakes—limited torque—preventing overloads and shocks—starting heavy loads—and many other uses.

★ *WRITE TO-DAY!*

For the new series of 6 illustrated Bulletins furnished FREE upon request. Featuring our complete line of Industrial Clutches and Couplings—Over-Running—Single Revolution—Friction—Centrifugal—Overload Release—Slip.

THE HILLIARD CORPORATION
126 W. 4th St. ELMIRA, N. Y.
Manufacturers of
INDUSTRIAL CLUTCHES

cent smaller, and unit labor cost was 17 per cent lower, in 1929 than in 1923.

It is now a well recognized fact that, with rising productivity and falling unit cost, either prices should fall or wages should rise, or both. This is a necessary means under ordinary peacetime conditions of maintaining economic balance and sustaining the volume of demand required to keep business on an active basis.

I have already pointed out that while productivity was rising rapidly, prices were substantially stable during the highly significant predepression years. Wages also underwent little change. Average hourly earnings in manufacturing, mining, and railroads, combined rose, to be sure, from 55 cents in 1923 to 57 cents in 1924, but advanced only to 58 cents in 1929. Furthermore, the net increase in average hourly earnings between 1919 and 1923 was only 4½ cents per hour.

Whatever may be the causes of depressions (and they are admittedly complex), we all recognize the gravity of the periodic upsets of our economic balance, notably after 1929. There will inevitably be fluctuations in prices, wages, production, employment, and the various elements that comprise our complex economy. But there are good reasons for the widespread hope of maintaining, during this postwar period, a better equilibrium of the forces that actuate our economic processes.

After World War I, there were few public measures designed to stabilize and aid business activities. Since then, in addition to the Federal Reserve Board then in existence, we have developed various agencies and functions of generally recognized value. By way of illustration, I may mention the insurance of bank deposits, mortgage insurance, new credit arrangements, and the new network of international bank-

ing and credit facilities.

Paralleling these various measures are policies adopted since World War I that affect more particularly the major groups of employes. These include a highly significant cushioning of purchasing power in the forms of unemployment insurance, retirement benefits, and workmen's compensation. Public and private agencies alike are also in a much better position to adjust enterprise and employment to meet periods of recession by appropriate emphasis on public works and long-range projects. There is also a much more favorable situation than after World War I in respect to reserves of buying power, due to savings and the more general recognition of the economic importance of maintaining a balance between the flow of income for investment on the one hand and for consumption on the other. This raises, to be sure, the difficult problem of maintaining wages as the basis of standards of living and consumer purchasing power, while at the same time keeping the cost of wages per unit of output within the essential limits of rising productivity. There is a basis for hope that in our democratic society, with its processes of public discussion and collective bargaining, reasonable and workable compromises can be achieved.

Incidentally, a note of caution is in order. In the prosperous twenties, failures of commercial and industrial firms averaged above 20,000 a year. In 1945, there were only 810 such failures, and during the first eight months of 1946, failures averaged fewer than 100 a month. Undoubtedly there is good reason for the view that we shall be able to avoid a recurrence of earlier rates of failures, but we must recognize that some increase in business failures may occur as we return to peacetime conditions.

Not the least of the contrasts between the present and the period following the first World War is the extent of our knowledge of what is going on and of the way our economy works. A comparison of a journal of current statistics of the early twenties with one now published shows a remarkably limited amount of information then available on a weekly or monthly basis. Our present knowledge of developments during that period has been obtained in large part from recent intensive study of Census data and business records not available

D. C. MOTORS

Good delivery on ¼, 1/3 & ½ H.P. direct current motors. Mfrs. of A.C. generators 500 watts to 125 K.W. Rotary converters. frequency changers, light plants.

KATOLIGHT

1415 First Avenue Mankato, Minn.

SOFT *but Tough!*

The NUPLA HAMMER is a hard hitting "softie" which will outlast other soft face hammers many times. The striking surface consists of a new type of self-healing plastic that does not damage delicate parts or finishes. Does not chip or crack . . . no fire hazard. Five sizes and ten weights.

Priced from $1.50 to $11.00 **NUPLA PLASTIC HAMMERS**

NEW PLASTIC CORPORATION · 1017 N. SYCAMORE AVE., LOS ANGELES 38, CALIF.

at the time. Even the factory weekly earnings series I have just used was computed recently on a monthly basis for earlier years between the censuses of manufacturers. Noteworthy instances of monthly data available at the earlier period are the Bureau's series of wholesale prices and retail food prices.

Recent intensive study of earlier sources and the development of sampling, indexing, and other techniques, together with the mechanization of the routine work of computation and tabulation, have made possible our present relative abundance of data available on a monthly, weekly, or even daily basis. Even more important is the now general recognition of the value and uses of economic data. That attitude is reflected significantly in the Employment Act of 1946, passed overwhelmingly by Congress, for consolidating efforts, public and private, to promote maximum production, employment, and purchasing power.

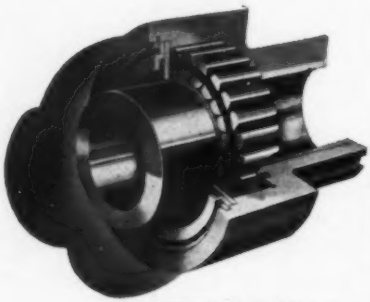
We learn something every day

ABOUT

FORMSPRAG

THE FULL COMPLEMENT

Over-Running Clutch



FRANKLY, we have been surprised to find there are so many different applications for Formsprag. We knew we had an outstanding product that would deliver high torque in a limited space, that would cut in and out hundreds of times a minute, that engaged positively and silently, that operated without backlash or vibration.

But we had no idea of the hundreds of different types of applications that Formsprag is now handling efficiently.

In manufacturing these many types it has been necessary to build Formsprag in many sizes and capacities, until we are now tooled up to produce a wide range of standard sizes, from 240 to 123,000 inch-pounds theoretical torque, in either plain or ball bearing types.

If you have, or think you may have an application, why not talk it over with us?

FORMSPRAG Company

1415 JARVIS • FERNDALE, MICH.

CHANGE YOUR DRILL PRESS INTO A TAPPER

Thrust a No. 1, 2 or 3A Dorman Tapper into the spindle of your drill press . . . insert the proper tap, tighten one set screw, adjust drill press speed and you are ready to tap holes up to 1¼".

The adjustable friction drive No. 1 tapper drives from 2-56 to ⅜" tap in steel or any other material. Simple adjustment changes from light friction to positive or any intermediate drive.

No. 2 positive tapper drives from ⅜" to ¾".

No. 3-A positive tapper drives from ½" to 1¼".

DELIVERY FROM STOCK SOME SIZES

Write for details.

DORMAN MACHINE TOOL WORKS

355 CANAL ST. • NEW YORK 13, N. Y.

MODERN CENTERLESS GRINDING PRACTICE

By D. E. Lower,
Abrasive Engineer,
Simonds Abrasive
Company

Part 2
Machines
Attachment and
Blades

All centerless grinding machines operate on the same basic principle of centerless grinding — utilizing work blades, a regulating wheel and a grinding wheel which between them provide a full floating condition to the work piece. We shall not attempt in this article to give complete descriptions of any of the various models available in this country, for that is not necessary to an understanding of how they operate, nor shall we attempt to evaluate their respective merits. All of them are doing satisfactory work of the sort for which they are designed in American shops. In the Cincinnati centerless machines the grinding wheel is carried on a fixed mount which is integral with the bed. There are two slides. On the lower slide the work rest is mounted. The upper slide is mounted on the lower slide and carries the regulating wheel unit. The lower slide can be locked to the bed and/or to the upper slide. It is thus possible to fix all three elements in one position, to fix the work blade with respect to the grinding wheel or with respect to the regulating wheel.

For thrufeed and endfeed work the first arrangement is used, with all elements locked together as shown in Fig. 1.

Most infeed work is done by locking the upper and lower slides together as shown in Figs. 2 and 3. This establishes a permanent relation between regulating wheel and work rest. Grinding contact is established by moving the regulating wheel, work rest and blade to the grinding wheel as a unit.

There are, however, certain conditions under which it is preferable to lock the lower slide to the bed, leaving the upper slide movable. In this set-up the work rest is in fixed position to the grinding wheel and the regulating wheel can be retracted from the unit. This makes for easier loading of small pieces by increasing the size of the V into which the parts are inserted, and is also safer. The arrangement is shown in Figs. 4 and 5.

The locked lower slide set-up facilitates automatic operation for with a retractable regulating wheel, fixtures can be designed which permit gravity to be used for ejection of the finished parts. See Fig. 6.

In Figs. 7 and 8 are shown the use of double work blades which are useful for many parts in preventing the marring of the work surface by a possible grinding action of the regulating wheel.

The sketches in Figs. 1 to 8 are by

Fig. 1. Bed and both slides locked together to keep both wheels and work rest in fixed relation for use in thru-feed and end-feed grinding.

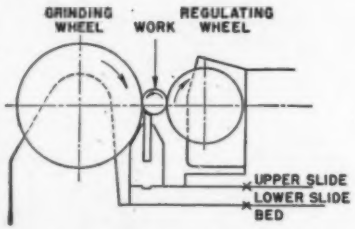
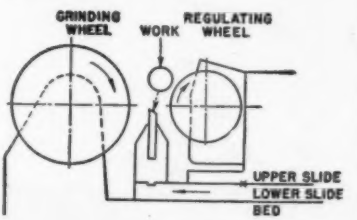


Fig. 2. Upper slide locked to lower, keeping regulating wheel and work rest in fixed position to each other. Loading position for much infeed grinding.



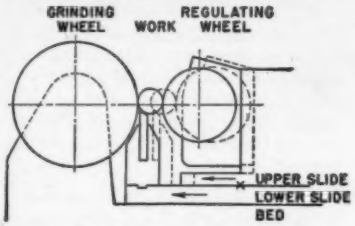


Fig. 3. Work rest and regulating wheel moved together toward grinding wheel. This is grinding position.

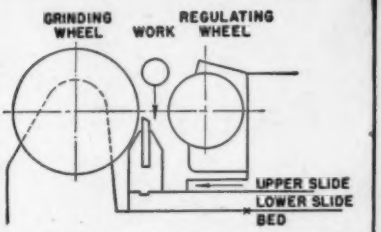


Fig. 4. Another set-up for infeed grinding, which makes loading of small pieces easier. Lower slide is locked to bed.

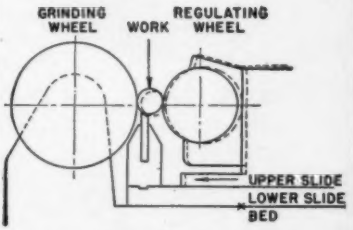


Fig. 5. Grinding position with lower slides locked to bed. Regulating wheel alone moves to establish grinding contact.

courtesy of Cincinnati Grinders Inc.

Tapers are ground on Cincinnati machines by the endfeed method with the grinding and regulating wheels and the work blade set in the fixed relation to each other. The grinding wheel or the regulating wheel or both are dressed to the required taper and the work is fed to an end stop.

In the Landis and Lidkoping machines, the work rest is mounted directly on the machine bed, both wheels being movable. Tapers are ground by the infeed, or plunge, grinding method, the faces of both wheels remaining parallel to their axes and the required taper being secured by swiveling the regulating wheel base, as in Fig. 9.

Both the Cincinnati and Landis machines use bevel topped work support blades, while the Lidkoping blade has a V-shaped top as shown in Fig. 10. During grinding the work rests only on the inclined surface of the V that is nearest the grinding wheel. The effect of the V-shape is essentially that of the double blades, each of which are beveled, sometimes used on Cincinnati machines for large or heavy pieces.

Attachments of various sorts are important in many types of centerless grinding.

With some kinds of work it is not sufficient to hold the work in position merely by means of the interaction of the regulating and grinding wheels with the work support blade.

In one job done on a Lidkoping machine it was deemed advisable to perform a centerless grinding operation with the help of centers. The parts are torsion spring bars used in a European motor vehicle. They run from .8" to 3" in diameter and from 24" to 100" long. Both ends have toothed heads.

Experience has shown that they are best ground if held between spring

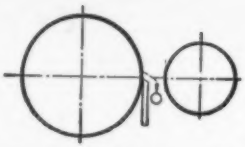


Fig. 6. With lower slide locked to bed, and regulating wheel retractable, fixtures can be dressed to make ejection of work automatic by utilizing gravity.

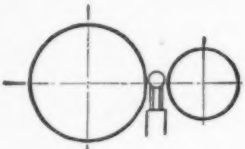


Fig. 7. Load.

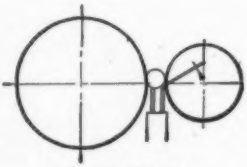


Fig. 8. Grind. Double work blades help prevent possibility of marring work surfaces by grinding action of regulating wheel.

loaded centers, held in tail stocks so designed that the centers are free to move in any direction. The axis of rotation is thus not determined by the centers, whose only function is to support the overhanging part of the rod which is not being ground. The actual grinding is done by the centerless method.

Many attachments have been devised to hold a piece in place when it must be ground at a point on the machine other than directly opposite the regulating wheel. The simplest are roller rests which merely support the overhanging portion of the part. Fig. 11 shows such an arrangement for grinding the base only of a projectile.

Bar grinding attachments are of this sort. A simple one for comparatively short bars is shown in Fig. 12. Small diameter work is usually supported on guide rests as shown here. Large diameters are best supported on roller rests, usually employing three rollers, to act both as supports and as a hold-down device. Very long bars can usually dispense with hold down devices, support of the bar at both entering and exit side of the machine being all that is needed.

For very long bars and shafts of large diameter, Lidkoping uses power driven rollers in order to relieve the wheels of part of the work of rotating the bar. It is claimed that this results in greater output, more economically.

CUT YOUR COSTS! (THE EASY WAY)

Send your cutting tools in today for Sharpening, Salvaging, Reconditioning

SAVE UP TO 70%

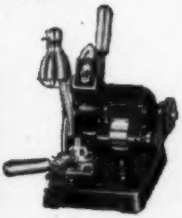
Rutland TOOL SERVICE

13006 GREELEY DETROIT 3, MICH.

HERE'S THE

LOW-COST WAY TO *Mill Small Parts*

NEW *Rouse* HAND MILLER



$98 (Without Fixtures)
F.O.B. Chicago, Motor Extra

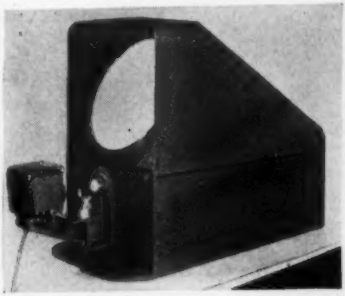
Rouse
Fixture Set-Ups that Speed Production.

It's easy to make light cuts—fast and accurately—on aluminum, brass, steel and other metals . . . This high-speed, motor-driven unit is ideal for second operations on plastics. *Anyone can quickly learn to run it.* Rouse Fixture Set-Ups increase productive capacity for a large variety of small parts for electrical work, instruments, aviation components, etc.

Available for immediate shipment. Write for illustrated circular and full details.

H. B. ROUSE AND COMPANY
2216 N. Wayne Ave. Chicago 14, Ill.

GOOD NEWS from PORTMAN



Now you can use Optical Projectors anywhere in your shop —to speed up production.

The Portman Model P2.5 Optical Projector is so ruggedly built and so easy to operate that many firms are using them right out in the shop—in places where they can do the *most good!* When you save on your inspection time you make money. The PORTMAN MODEL P2.5 should help you make this extra money.

The full price is only $175.00 and deliveries are excellent.

Write or wire for details.

PORTMAN MACHINE TOOL CO.
70 Portman Road, New Rochelle, N. Y.

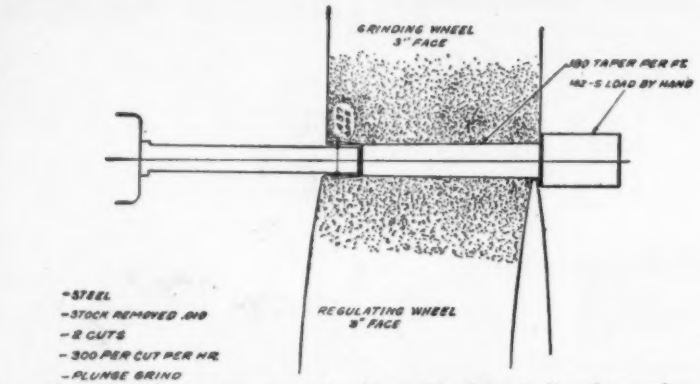


Fig. 9. Tapers are ground on a Landis machine by swiveling the regulating wheel.

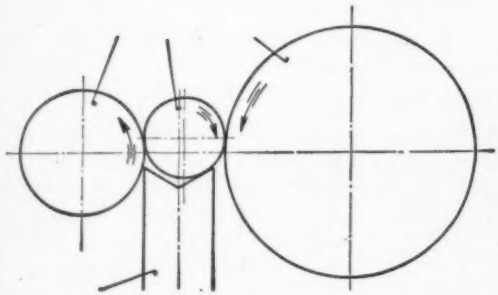


Fig. 10. The work blade on Lidkoping centerless machines has a V-shaped top. During grinding, the work rests on the bevel nearest to the grinding wheel.

The power driven bar grinding attachment consists of two wide cast iron tables which can be adjusted vertically and transversely. A Lidkoping machine equipped with power driven rollers is shown in Fig. 13.

The pressure roller method which is often used for off-set grinding is essentially the grinding of work held in a centerless chuck, which is made up of the work rest, the rollers and the regulating wheel. This arrangement may be used to grind diameters concentric with one already ground, or one which is a definite amount eccentric to another. For eccentric grinding, the shaft is held eccentrically in a cylindrical shuttle which is rotated in the "centerless chuck."

Three simple work-holding attachments are shown in Figs. 14, 15 and 16, for the final three set-ups for grinding a textile machine spindle. The first set-up is not shown since it is a simple

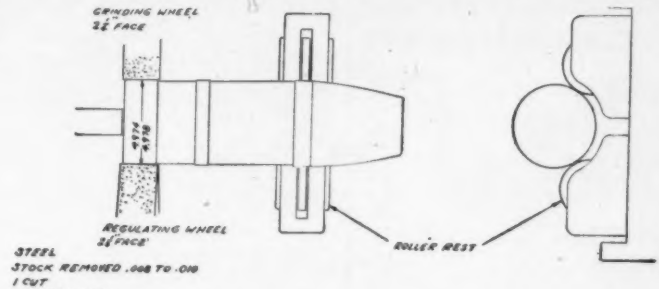
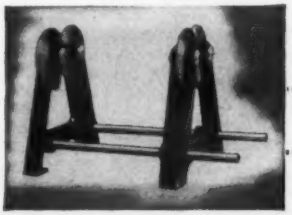


Fig. 11. Top view of roller rest attachment for supporting outer end of projectile while diameter at other end is being ground. Some such arrangement is often needed in peace-time production.

thrufeed operation on straight bar stock.

All four operations are performed on the same Landis machine, using the same wheel. The regulating wheel is swiveled to take care of the tapers. The only other change is that of the work-holding attachments, which are different for each operation, and in all



Anderson

BALANCING WAYS

Swing	Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

In any shop where rotating parts are handled this simple, sturdy and thoroughly dependable device will quickly prove its efficiency for accurate balancing and truing operations. It assures better work . . . saves time and labor. No leveling required.

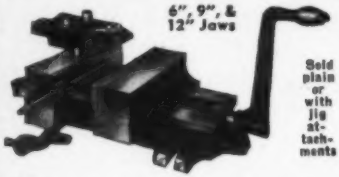
Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a quick, accurate indication of whether or not the work is in perfect balance.

Write for Bulletin 3-5

ANDERSON BROS. MFG. CO., ROCKFORD, ILL.

ROCKFORD
Anderson
BROS. MFG. CO.
ILLINOIS

Ready-Made Fixture
FOR REPEAT-OPERATION WORK



In sizes up to 124 lbs., the Graham Multi-purpose Vise serves hundreds of precision holding needs for plain and irregular work. Numerous special jaws, stops, guides, etc., equip it to serve in place of special toolmaking jobs otherwise required.

Many patterns from Straight Knurls with "Adjust-angle" Knurl Holder

With shank made to fit your turret, this Tool permits adjusting the angle of straight knurls to produce straight, spiral and checkered patterns of wide variety on work up to 2½" dia.

BULLETIN 41

describes both of these tools, with Attachment and Price Data. SEND FOR IT.

GRAHAM MFG. CO.
57 Bridge St. East Greenwich, R. I.

cases are mounted on special micrometer adjusted work rests.

Collets and arbors of special design are often useful for holding difficult parts. The part shown in Fig. 17 is typical of what might be called a "borderline" centerless job. It was desired to grind the inside face lightly while grinding the neck. The shortness of the piece compared to its diameter posed a holding problem. A chucklike holder using collet rings for holding the piece was designed. The chuck is attached to a rod which projects over and is supported by the work rest at the other end. While the neck is being ground the operator presses against a knob on the other end of the device to press the neck of the piece against the side of the grinding wheel.

In Fig. 18 is shown a piece presenting a similar problem, which was solved in an entirely different way. In this instance the outer bearing race, which must be ground on both the diameter

• • •

Fig. 12. Cincinnati centerless machine equipped with bar fixture which will grind work from ⅛" to 1¼" in diameter and up to 30" long.

HART'S Machine Vise Jaws

These Jaws are useful on any machine table. The angle holding the work down. Suitable to clamp or bolt to table. The hardened tool steel jaw measures 3"x6" ½" thick angle edge serrated.

HART'S Milling Fixtures

These fixtures will make themselves popular and profitable in your shop. Easily kept clean to receive the work. May be used in either horizontal or vertical position. Suitable to hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on the bottom as well as on the back. Shipped in pairs, unless otherwise ordered. Made in 4 sizes —to hold stock from ½ to 5 inches.

HART MACHINE CO.
26 MATHER ST., DORCHESTER, BOSTON, MASS.

When writing for descriptive circular kindly mention the BLUE BOOK.

For POSITIVE Neutral

Specify

- COMPACT DESIGN
- HIGH TORQUE
- HIGH-RATIO LEVERS
- POSITIVE NEUTRAL
- PRECISION BUILT
- LONG WEAR LIFE
- EASY ADJUSTMENT

ROCKFORD
PULLMORE

MULTIPLE-DISC
CLUTCHES

When the powerful engagement of PULLMORE Multiple-Disc CLUTCHES is released, declutching is instant and positive. The perfectly flat, floating discs separate and ride free — without drag, heat or abrasion. This positive neutral is especially valuable in rapid-operating, multiple-cycle machines.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCH DIVISION BORG-WARNER
1309 Eighteenth Avenue, Rockford, Illinois, U. S. A.

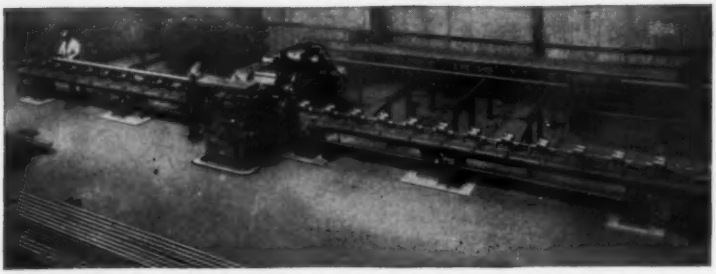


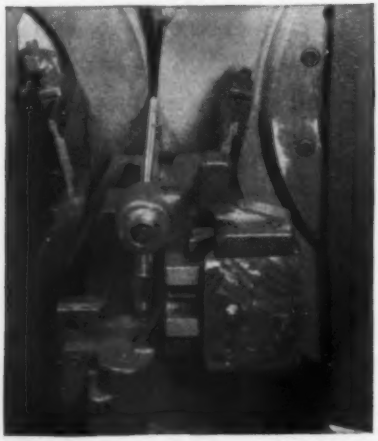
Fig. 13. Lidkoping centerless machine with live roller tables for grinding bars 1.2" to 6" diameter, up to 25' long.

• • •

and the flange, is placed over the end of an arbor and advanced to the work position by a pusher type loader. When the regulating wheel is advanced, the part is pushed up the angular face of the work blade out of contact with the arbor, and so against the grinding wheel. The part is pressed against the side of the grinding wheel for grinding the shoulder by the regulating wheel, which is given reverse feed for the purpose.

• • •

Fig. 14. Grinding the straight section of a textile spindle to size in a special workholder held on a micrometer adjusted work rest. Landis machine.



The part sketched in Fig. 19 is a sample of material which is to be tested for tensile strength. It is centerless ground to make certain that the area of the section will be highly accurate and without bending, compressing, or setting up stresses from heat in the test sample. It is ground from a solid cylinder on a Cincinnati machine. The finished piece has two straight and four tapered sections.

Loading the straight piece would present no problem, but unloading the deeply recessed finished piece would be difficult without the fixture shown in Fig. 20. The fixture is a cradle which is lowered between the wheels from above. A roller on the linkage follows a cam which guides the work vertically to insure that it will clear the wheels before being moved out. Without such a device there would be danger of dropping the piece between the wheels when unloading.

In Fig. 21 is shown a simple attachment for loading electric motor rotors for grinding the two bearing diameters

ERRINGTON MECHANICAL LABORATORY

MAIN OFFICE AND WORKS: STATEN ISLAND 4, NEW YORK

Chicago Office:
6701 N. SIOUX AVENUE

New York Office
170 BROADWAY

CLUTCH OR CONE DRIVE

Our High Speed Tappers are Super-Sensitive for Small Tapping

All Styles and Sizes— 0 to 2" Taps

Style B Positive Adjustable stop holds work down

Style C Graduated Adjustable Safety Friction

Style D-E, Quick Change Tools

Long Service

CLEAN IMPRESSIONS

Deep, hand-cut letters in special-formula steel that is the result of 90 years of die making; faces angled for added strength. For parts identification, tool marking, numbering. Available through mill supply houses.

CHAMFERED CORNERS *for locating the base*

HOGGSON & PETTIS MFG. CO., New Haven 7, Conn.

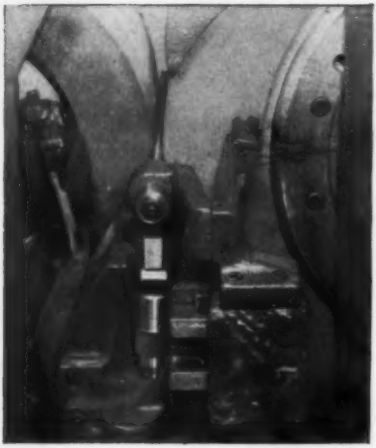


Fig. 15. Grinding short taper on textile spindle shown also in Fig. 14. The spindle is held in another special, micrometer-adjusted work holder. Landis machine.

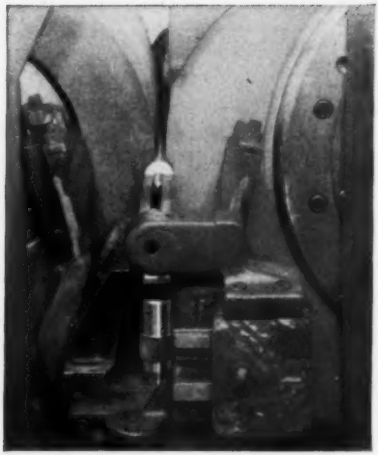


Fig. 16. Grinding long taper section on same textile spindle shown in Figs. 14 and 15. It is held in still another special-micrometer-adjusted work rest. Landis machine.

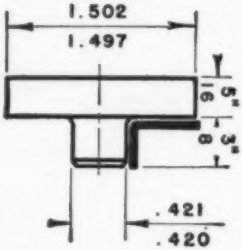


Fig. 17. This piece is held in a special collet type attachment for grinding on Cincinnati machine.

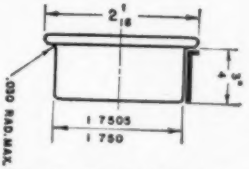


Fig. 18. This bearing race is held loosely on an arbor for loading and unloading. The regulating wheel lifts it off the arbor and against the grinding wheel.

Fig. 19. Sample piece to be tested for tensile strength. It is centerless ground to make certain that the main body will be accurate.

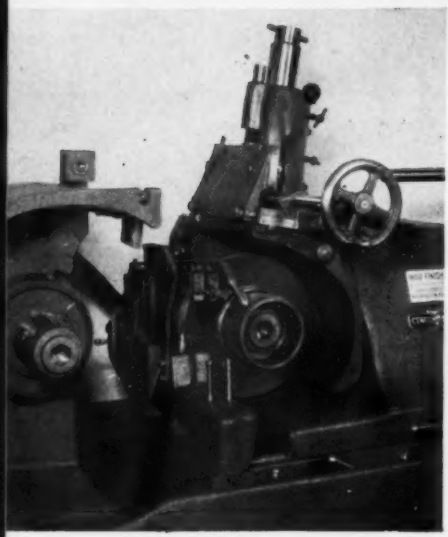


Fig. 20. This cradle type work holding fixture expedites loading and also makes it easy and safe to lift the work from between the form-trued wheels which would otherwise be difficult to do without dropping the work. Cincinnati.

• • •

simultaneously. Loading is accomplished hydraulically.

Automatic loading by means of magazines or hoppers can be used to speed production on parts whose design permits. Often they make it possible for one operator to handle several machines, since all that he has to do when the operation is fully automatic is to keep the magazines filled with workpieces.

Some automatic magazine feed devices feed the parts for thrufeed grinding in a continuous stream. However,

REDUCES PRODUCTION COSTS . . . INCREASES EFFICIENCY!

The NEW AIR-OPERATED ALLEN DIAL FEED TABLE

for use with

- **PUNCH PRESS**
- **DRILL PRESS**
- **PRODUCTION MILLERS**

Recommended for assembling, Punching, Machining of nuts, stampings, etc.

Blank Tables available in ¼", 5/16" & ⅜" thickness. 5/16" supplied unless otherwise specified.

The Allen Dial Feed Table operates by means of compressed air through a 3-way air valve, moves a hardened and lapped piston to move the pawl arm. The Pawl indexes the table and LOCKS it in the indexed position until the valve is released allowing a spring to return the Pawl, ready for next indexing.

•

Specifications

Dia. of Table—7¼".
Height of Table from Base—2 11/16".
Standard 12-position Table.
All working parts hardened.

LIST PRICE
$125.00
F.O.B. Brooklyn, N. Y.
Write for Literature

A. K. ALLEN COMPANY
3011 FORT HAMILTON PARKWAY, BROOKLYN 18, N. Y.

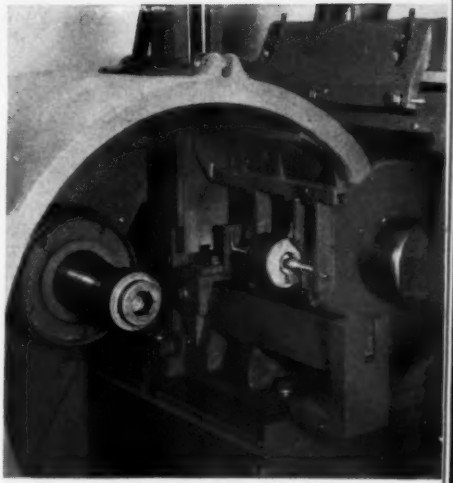


Fig. 21. An hydraulically operated loading attachment on a Cincinnati centerless. The bearing diameters of a motor rotor are ground simultaneously in this operation.

• • •

if the parts are of such shape that they may interlock it is advisable to feed them one at a time. This does not prevent automatic operation, although of course it slows production. The attachment shown in Fig. 22 is being used in that way. The feed is intermittent, but is fully automatic so long as the operator keeps the magazine loaded.

While not, strictly speaking, an "attachment" the work blade is a highly important adjunct to the centerless grinding machine.

Most centerless grinding is done with work blades having an angular top, because of the greater rounding effect that

BUILT FOR IRREGULAR SURFACES

Through its ability to adapt itself to the contour or irregular surface of the workpiece, the Vonnegut Brush-Backed Abrasive Head is now increasing production and decreasing costs on finishing operations in plants throughout the country . . . working in metal, wood, plastic and other materials.

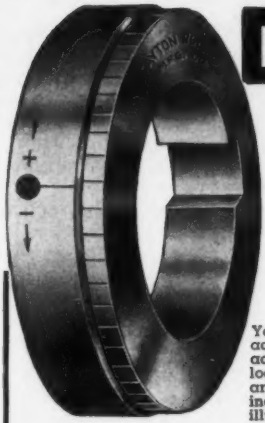
The yielding action of the brushes, which back up the 32 strips of abrasive, automatically causes the Head to conform with irregularly shaped surfaces.

Your plant may have many uses for Vonnegut Brush-Backed Abrasive Heads. Write today for further information.

VONNEGUT MOULDER CORP.

1805 Madison Avenue **Indianapolis, Indiana**

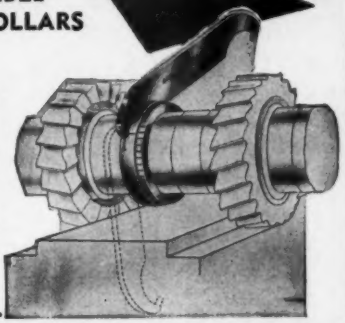
FAST, ACCURATE SPACING



Graduated in thousandths, you have plus or minus .0005" at your fingertips with

DAYTON ROGERS ADJUSTABLE SPACING COLLARS

for
SIDE MILLING CUTTERS
GANG MILLING SET-UPS



You can make an accurate, positive adjustment just by loosening the cutter arbor nut and making adjustment as illustrated.

Made in 12 standards for cutter arbors from ⅜" to 2". Write for illustrated Bulletin 120-7.

DAYTON ROGERS MFG. CO.
2849 12TH AVE. SO., MINNEAPOLIS 7, MINN.

DRILL JIG BUSHINGS

Accurate
Interchangeable
Concentric

Acme Industrial Company
210 N. LAFLIN ST.
CHICAGO 7, ILLINOIS

WRITE FOR FREE CATALOG!

Quick Acting
JOHNSON
FURNACES

Turn the Heat on Heat-Treating Costs
CUT WASTED TIME
with JOHNSON Hi-Speed No. 130A

For quick accurate heat-treating high speed steels, dies and tools. Gets the job done before conventional furnace heats up. Saves gas. Counter-balanced door opens upwards. Firebox 7¾ x 13 x 16½. Complete with Carbofrax Hearth, GE Motor and Johnson Blower.

4-Burner for temperatures 1400-2350° F., $295.00

6-Burner for temperatures 1800-2400° F., $325.00 F.O.B. Factory

SEND FOR FREE CATALOG

JOHNSON GAS APPLIANCE CO.
570 E Ave. N. W., Cedar Rapids, Iowa

can be secured. The action is quite complex, but essentially it amounts to this: With a flat top blade, when a low spot on the work comes in contact with the blade or the regulating wheel, the tendency is for the grinding wheel to produce a correspondingly high spot. This tendency is lessened when the work is positioned lower—that is, nearer the center lines of the wheels. When a low spot comes in contact with the angular top of a blade, the work obviously sinks lower, more material is removed from the high spot and the true cylindrical shape is gradually produced.

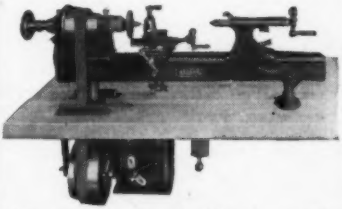
From that it might seem desirable to have a steep angle on the blade, to expedite the rounding action. However, the angular top produces horizontal pressure which has to be resisted by the blade. With steep angle and a wide blade this pressure may become far too great. So it is good practice to reduce the blade angle for the wider cuts.

For example, a given piece of work may be properly ground with a 4" wide cut on a blade having a 30 degree angle. Increasing the width of the cut might make it advisable to reduce the blade angle to 20 degrees. That reduces the lateral pressure on the blade. For the same reason, the blade angle should be smaller for larger diameter work.

For blades with a single bevel, such as is used in the Cincinnati machines, the thickness of the blade runs from ½" to ¾"—depending upon the diameter of the work. For work pieces of small diameter the part of the blade that supports the work should be slightly thinner than the diameter of the work. Use the thickest possible blades for large diameter work. In short, the thickness of the blade is determined by work diameter while the length of the blade is determined by width of the wheel.

The finish secured with centerless grinding depends to a great degree upon

Integral Drive Precision Bench Lathes. Double-taper headstock bearings of highest accuracy, or best precision preloaded ball bearings. Two good sizes ¾" and 1". *30 Precision attachments available.*



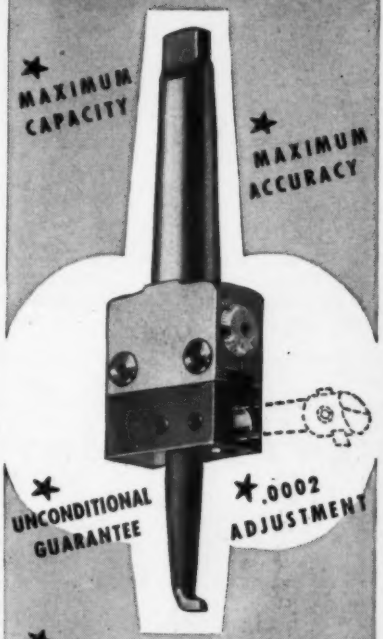
Open Cone Lathes world-known. Four sizes, with compact under-bench Motor Drive Unit.

Stark Precision Bench Milling Machine. Plain and Spiral Models

"ELECTROBLAST" High Speed Muffle Furnace. Two excellent small sizes.

Stark Tool Company
WALTHAM · MASSACHUSETTS
ESTABLISHED · 1862
Originators of the American Bench Lathe

The
MAXWELL
Precision Boring Head



• 3 sizes from $44.00 to $105.00. Boring capacity ⅜" to 15". Available with any standard shank. Immediate delivery from stock. Circular upon request.

THE MAXWELL CO.
220 BROADWAY · BEDFORD, OHIO

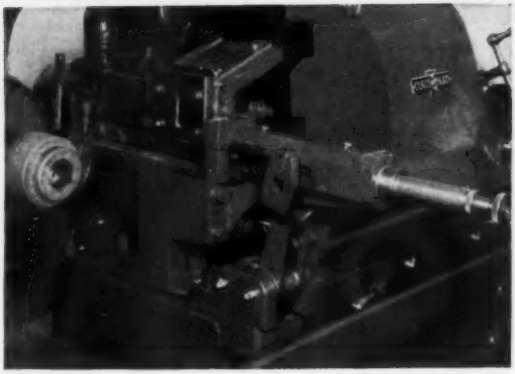


Fig. 22. This loading attachment is feeding parts one at a time, thrufeed on a Cincinnati machine. The parts cannot be fed continuously because if they touch each other they are likely to interlock.

the material used for the work blade's wearing surface. Exactly which material to use for the blades depends primarily upon the work material.

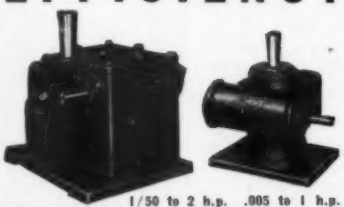
Cemented carbide inserted blades have the widest application. They are suitable for cast iron, hard and soft steel, some of the harder stainless steels, non-ferrous metals and the various non-metals such as plastics, glass and so forth. Altho carbide insert blades are higher in first cost, the cost per piece produced is lower because the carbide blades require fewer regrindings.

In shops where it is necessary to reshape blades frequently to make them conform to various shapes of work pieces—as in a job shop—high speed steel blades may be preferable to cemented carbide blades due to the lower cost of grinding them.

If the desired surface finish cannot be secured with cemented carbide blades, the condition can often be rectified by changing the blade material to Meehanite or grey cast iron. This is often true when grinding certain grades of stainless steel. However, a satisfactory finish can often be secured on stainless steel, while using cemented carbide blades, by adding a greater amount of soluble oil to the coolant.

In the next article, we shall discuss the selection of wheels and coolants for centerless grinding.

Speed Reducer
EFFICIENCY



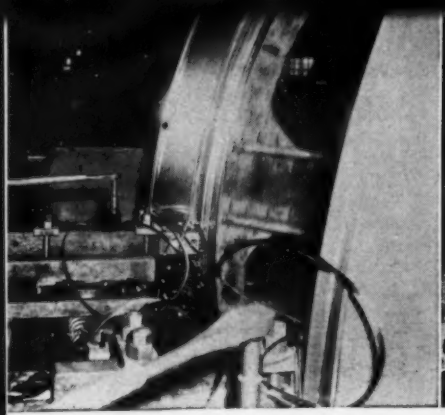
1/50 to 2 h.p. .005 to 1 h.p.

EFFICIENCY in speed reducers today means **precision** for accuracy, **long-lived** construction for **dependability** — low maintenance cost — qualities that distinguish the Abart line.

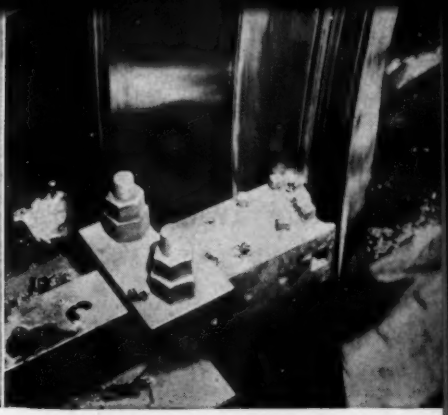
Abart **SPEED REDUCERS**

Spur, Worm, and Combinations in over 75 types and sizes, from 1/50 to 417 h.p. Ratios from 2:1 to 10,000:1.
New Abart Bulletins on duties you require. Full information with Valuable Engineering data.
ABART GEARS: Cut to your specifications of any gear material. No stocks.

ABART GEAR & MACHINE CO.
4832 W. 16th St. Chicago 50, Ill.



Taking a roughing cut on the face of a mine hoist drum with a standard Carboloy tool. Tool peels off miles of chips before re-grinding becomes necessary; produces over 12 tons of metal cuttings during machining operations on each drum unit.



Machining the side and face of the flange on a large mine hoist drum at Koppers Company, Inc., Bartlett Hayward Plant, Baltimore, Maryland (right hand view). Assembled drums are 20 feet in diameter; flange diameter is 21 feet, 6 inches; and width between flanges is 7 feet, 10½ inches.

Twelve Tons Of Chips From One Set-Up

How would you like to have to remove 12 tons of chips—24,000 lbs. of them—from just one part in a single set-up in a lathe? That's one of the jobs you'll find in the plant of Koppers Company, Inc., Bartlett Hayward Plant, Baltimore, Maryland.

It's a different kind of mass production, but it is still mass production. The parts are mine hoist drums, 20 feet in diameter, with a flange diameter of 21 ft. 6 inches. Width between flanges is 7 feet 10½ inches. The job is to remove the metal between the flanges and turn the flanges down to size.

A specially designed pit-lathe is used for this type of work at the Bartlett Hayward Plant. Machining consists of first roughing the flange sides and face and drum OD and then plunge cutting the grooves in the drum in which the 2½ in. wide mine hoist cable is to lie. Grooves are finish formed.

Since cutting time is the major factor in total production time of such a job, Carboloy tools are used for all operations. The roughing tools are standard 1¼ inch square shank tools tipped with Grade 78B. These cut at a surface speed of 240 feet per minute—3 to 4 times the speed possible with high speed steel tools. Depth of cut is ¾ inches on

CERWECO
STEEL APRON BRAKE

NOW AVAILABLE IN

6 AND 8 FT. 14 GA.

10 FT. 16 GA. CAP

EASE AND SIMPLICITY

HAND OPERATED

ENGINEERED AND BRACED TO DO THE JOB RIGHT

FULLY GUARANTEED

QUICK DELIVERIES

WRITE FOR CIRCULAR

WM. C. JOHNSON & SONS MACHY. CO.

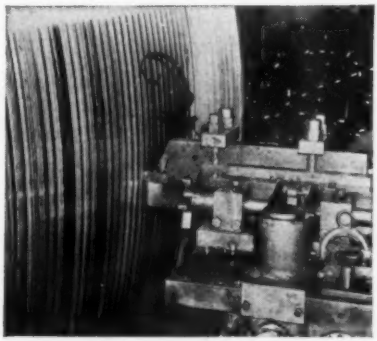
1211 Hadley St. St. Louis 6, Mo.

roughing. Feed is .020" to .030". Tools are mounted in a specially designed tool holder, consisting of a heavy extension bar holder—to give the tool maximum support.

Grooves are rough plunge cut with ¾ inch tools, and then finished with similar form tools having a 1⅜ inch radius. No exact records are available as to life between grinds of these tools. It is reported however that literally miles of chips are removed before it is necessary to shut the machine down for tool sharpening or changes.

• • •

Grooving operation in mine hoist drum. These grooves—in which the 2½" diameter steel cable will lie when drum is in operation—are rough cut to depth with a ¾" width tool, plunge feed. They are finished with a special form tool ground with a 1⅜" radius.



High Speed Cutting Tools

- Special high speed circular, dovetail, flat form and special tool bits.
- Design and manufacture of small machines, jigs, gages and experimental parts.
- Regrinding and salvaging high speed flat form, special bits and small flat broaches.

DELIVERY AS REQUIRED
WRITE FOR QUOTES

Attractive Proposition for Representatives

Lincoln Park Manufacturing Co.
3302 Dix Road Lincoln Park, Mich.

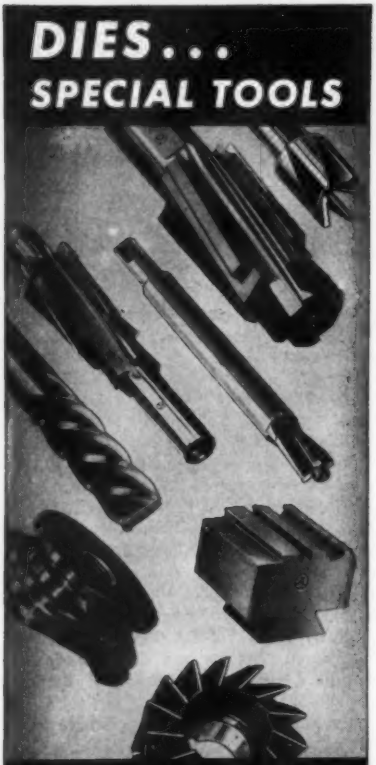
Design of Helical Compression Springs

by

Edward J. Rantsch, M. E.

Reliable data pertaining to the design of helical compression springs, made from square wire, is difficult to obtain. In the hope that experimental data will be of assistance to engineers, some information on this subject is herewith submitted to engineers and other executives whose work is concerned with springs.

At the outset I stated that the giving of a formula for the calculation for strength, compression, or the load required to compress a spring any certain distance is not intended. Instead, the machine used to measure compression is so designed that a separate reading in thousandths of an inch can be taken, when the spring is compressed, due to any load shown on the dynamometer in lbs. As the load in lbs. is in a direct relation to the amount of compression in thousandths of an inch, it is only necessary to apply a load of 100 to 250 lbs. and read the amount of compression on the dial indicator in thousandths of an inch for that load. If, when a load of 250 lbs. is applied and the spring is compressed to .250", then each thousandth of compression equals 1 lb., and should it be required to have 1000 lbs. load on the spring, it would compress one inch. The above remarks in reference to load in lbs. and compression in the thousandths of an inch have been found to exist in as many cases as have been checked on the dynamometer. That this direct relation exists cannot be disputed. Owing to the fact that so many unknown values must be assumed in the calculation and formulas for spring design, values we really know nothing about, it is therefore impossible to give any reliable data, except that data which may be available from time to time under some experiment. But valuable information on the general design can be given, and certain limits set forth which, if followed, will result in a spring which will hold up, and not "set". These limits have been found by actual experiments, and a table compiled to facilitate the design for springs that will not "set" when compressed to a point where coils touch each other. The pitch of coils and helix angle are constant with each other all thruout the table. For instance; it is desired to have a compression spring made from 1" square steel wire; what is the smallest outside diameter (O. D.) and the longest pitch ("P") to use so that, were the spring compressed to the limit or closed position (coil to coil), it will not set. Looking at the table, it is noted that for thickness "T" of wire 1", the smallest outside diameter is 5"; the inside (I. D.) 3"; the pitch ("P") 1½". The length "L" depends on the amount the spring is to be compressed. If the spring is made smaller than 5" O.D. or the pitch "P" be increased, the spring would set when compressed to a closed position. The pitch of spring "P" should never be more than one-half the inside diameter or .5 I.D. The outside diameter should never be less than five times the



If you need Tools for ordinary production —or if your need is for intricate Tools requiring special development skill, we can serve you.

Through our complete tooling service we are equipped to design and build special tools, dies of all kinds—blanking, forming and finishing for metal—and cutting dies for soft materials.

Write us or phone Buckingham 3417

Andersons, Inc.

2329 NELSON ST., CHICAGO 18, ILL.

thickness of square wire, or 5 T. to avoid setting of the spring when it is compressed. "S" in the table is the space between two coils. The angle in the small diagram at the upper left hand corner is developed from "P" divided by the inside diameter x 3.1416 = 9° 2′. This angle is constant thruout the whole range of the table. The developed angle for the outside diameter is shown in the upper right hand corner and is equal to P/3.1416 x O.D. = tangent of angle = 6° 48′. This angle is also constant thruout the table. However, referring to the angles given on the spring shown at top of table, 14° 2′ and 10° 37′, these were derived from ½P/I.D. and ½P/O.D. respectively. These angles also are constant thruout the table, and are the results of winding the developed angles shown in the upper corners into a circular form such as the spring. If we had a spring 8" O.D. and 6" I.D. 3" pitch, we would have for developed angles 3"/3.1416 x 8 = .1194 tangent of angle, = 6°48′, and 3"/3.1416 x 6 = .1592 = tangent of angle, = 9° 2′. Now taking ½P as 1½" and dividing by the outside diameter we have ½P/8 = 1½"/8 = .1875 = tangent of angle at outside diameter of spring of 10° 37′, and ½P/6 = 1½/6 = .25 = tangent of inside diameter of wound spring. Then 14° 2′ is to 10° 37′ as 9° 2′ is to 6° 48′ or 14° 2′ :: 10° 37′: 9° 2′ :: 6° 48′. Angle 9° 2′ should never exceed 10° nor should angle 14° 2′ exceed 15°. This table has all angles constant thruout its entire range.

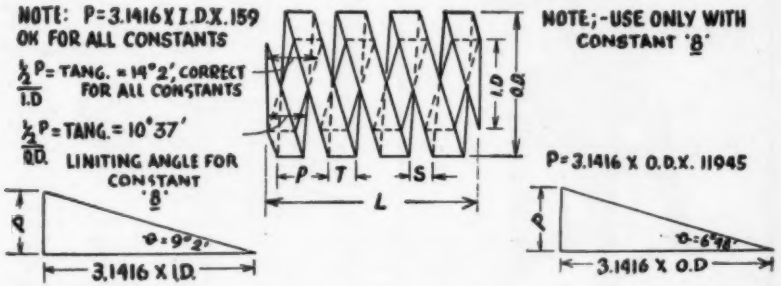
HARDENING SPRINGS

One of the best materials for making springs is chrome-vanadium steel.

In hardening these springs, they should be heated to about 1600° F. and quenched in oil. The No. 2 Houghton quenching oil has been found very satisfactory for this work and on other die and tool hardening jobs as well. After quenching in oil, springs are

drawn in tempering salts such as the 275 Temp. salts furnished by Houghton & Co., using a special thermometer reading to 1000°F. The temper required for larger springs is approximately 700 to 750°F. Smaller springs roughly 550 to 650, according to the temper required and the service function of the springs. It is impossible to draw these springs in oil because at 500 to 550°F. the oil would flash. The 275 Temp. Salts perform well, without danger of fire or injury to personnel, at the same time, leaving the work clean.

A spring should be checked on the dynamometer; should it be too weak or too strong, a second spring must be made, making a selection from the table until one is found which will serve the purpose. The table can also be used for springs of round wire, if desired.



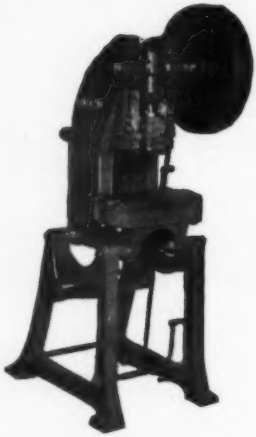
SQUARE COMPRESSION SPRINGS

• • •

Size of wire	Constant	O.D.	I.D.	P	S
.125″	5	.625″	.375″	.1875″	.0625″
.125″	6	.750″	.500″	.250″	.125″
.125″	7	.875″	.625″	.3125″	.1875″
.125″	8	1.000″	.750″	.375″	.250″
.15625″	5	.781″	.469″	.234″	.078″
.15625″	6	.9375″	.625″	.3125″	.156″
.15625	7	1.094″	.781″	.391″	.234″
.15625	8	1.250″	.9375″	.469″	.3125″
.1875″	5	.9375″	.5625″	.281″	.09375″
.1875″	6	1.125″	.750″	.375″	.1875″
.1875″	7	1.3125″	.9375″	.469″	.2815″
.1875″	8	1.500″	1.125″	.5625″	.375″
.21875″	5	1.094″	.656″	.328″	.109″
.21875″	6	1.3125″	.875″	.4375″	.219″
.21875″	7	1.531″	1.094″	.547″	.328″
.21875″	8	1.750″	1.3125″	.656″	.4375″
.250″	5	1.250″	.750″	.375″	.125″

Size of wire	Constant	O.D.	I.D.	P	S
.250″	6	1.500″	1.000″	.500″	.250″
.250″	7	1.750″	1.250″	.625″	.375″
.250″	8	2.000″	1.500″	.750″	.500″
.28125″	5	1.406″	.843″	.421″	.140″
.28125″	6	1.6875″	1.125″	.5625″	.281″
.28125″	7	1.969″	1.406″	.703″	.421″
.28125″	8	2.250″	1.6875″	.843″	.5625″
.3125″	5	1.5625″	.9375″	.469″	.156″
.3125″	6	1.875″	1.250″	.625″	.3125″
.3125″	7	2.1875″	1.5625″	.781″	.469″
.3125″	8	2.500″	1.875″	.9375″	.625″
.34375″	5	1.719″	1.031″	.515″	.172″
.34375″	6	2.0625″	1.375″	.6875″	.344″
.34375	7	2.406″	1.719″	.859″	.515″
.34375″	8	2.750″	2.0625″	1.031″	.6875″
.375″	5	1.875″	1.125″	.5625″	.1875″
.375″	6	2.250″	1.500″	.750″	.375″

MACO
Punch Presses



No. 16—5 Ton

No. 18—Fabricated—8 Ton

No. 20—12 Ton

Specifications for No. 20

- V Extra heavy construction
- V Crankshaft, main bearing, 1-15/16"
- V Crankshaft bearing, 2-1/16"
- V Inclinable
- V Elevating screw

Machines built for the trade; on their exclusive merits, performance and durability, by

MICHAEL AMENDOLA & CO.
1059 Washington Avenue
Bronx 56, N. Y.

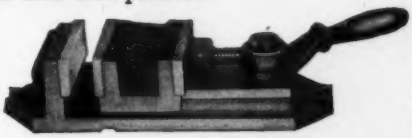
Size of wire	Con-stant	O.D.	I.D.	P	S
.375"	7	2.625"	1.875"	.9375"	.5625"
.375"	8	3.000"	2.250"	1.125"	.750"
.4375"	5	2.1875"	1.3125"	.65625"	.21875"
.4375"	6	2.625"	1.750"	.875"	.4375"
.4375"	7	3.0625"	2.1875"	1.09375	.65625"
.4375"	8	3.500"	2.625"	1.3125"	.875"
.500"	5	2.500"	1.500"	.750"	.250"
.500"	6	3.000"	2.000"	1.000"	.500"
.500"	7	3.500"	2.500"	1.250"	.750"
.500"	8	4.000"	3.000"	1.500"	1.000"
.5625"	5	2.8125"	1.6875"	.84375"	.28125"
.5625"	6	3.375"	2.250"	1.125"	.5625"
.5625"	7	3.9375"	2.8125"	1.40625"	.84375"
.5625"	8	4.500"	3.375"	1.6875"	1.125"
.625"	5	3.125"	1.875"	.9375"	.3125"
.625"	6	3.750"	2.500"	1.250"	.625"
.625"	7	4.375"	3.125"	1.5625"	.9375"
.625"	8	5.000"	3.750"	1.875"	1.250"
.750"	5	3.750"	2.250"	1.125"	.375"
.750"	6	4.500"	3.000"	1.500"	.750"
.750"	7	5.250"	3.750"	1.875"	1.125"
.750"	8	6.000"	4.500"	2.250"	1.500"
.875"	5	4.375"	2.625"	1.3125"	.4375"
.875"	6	5.250"	3.500"	1.750"	.875"
.875"	7	6.125"	4.375"	2.1875"	1.3125"
.875"	8	7.000"	5.250"	2.625"	1.750"
1.000"	5	5.000"	3.000"	1.500"	.500"
1.000"	6	6.000"	4.000"	2.000"	1.000"
1.000"	7	7.000"	5.000"	2.500"	1.500"
1.000"	8	8.000"	6.000"	3.000"	2.000"
.016"	5	.080	.048	.024	.008
.016	6	.096	.064	.032	.016
.016	7	.112	.080	.040	.024
.016	8	.128	.096	.048	.032
.020	5	.100	.060	.030	.010
.020	6	.120	.080	.040	.020
.020	7	.140	.100	.050	.030
.020	8	.160	.120	.060	.040
.026	5	.130	.078	.039	.013
.026	6	.156	.104	.052	.026
.026	7	.182	.130	.065	.039
.026	8	.208	.156	.078	.052
.031	5	.155	.093	.0465	.0155
.031	6	.186	.124	.062	.031
.031	7	.217	.155	.0775	.0465
.031	8	.248	.186	.093	.062
.037	5	.185	.111	.0555	.0185
.037	6	.222	.148	.074	.037
.037	7	.259	.185	.0925	.0555
.037	8	.296	.222	.111	.074
.045	5	.225	.135	.0675	.0225
.045	6	.270	.180	.090	.045

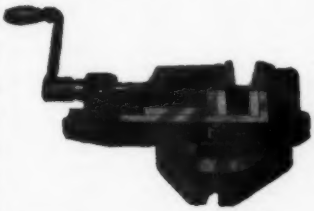
"MODERN" VISES

are precision-built with hardened and ground jaws for rapid production work on milling machines, shapers and drill presses.

CAM VISES . . .

Jaw dimensions: width 4" or 5", depth 1½", maximum opening 2" or 3".





. . . SWIVEL VISES

4", 5", 6".

Write for folders

MODERN TOOLS

BERLIN, CONN.

Manufacturers of Precision High Speed Steel and Carbide Cutting Tools.

If you want
MORE PARTS *per hour*
LOWER COST *per part*

the BARKER WRENCHLESS CHUCK can do it faster, better and stand up to it longer. Where the run is continuous on turrets, engine lathes, cutting off machines, drill presses or any other type of chucking machine, these Chucks will increase production and pay for themselves in 60 to 90 days while doing it. See how a Barker Wrenchless Two-Jaw or Three-Jaw Chuck can speed up production in YOUR plant.

Write for bulletin 201 today

Chuck Division

THOMAS HOIST CO.

24 S. HOYNE CHICAGO 12

Janette
SPEED
REDUCERS
ONE SOURCE . . .
Motorized or Motorless
All motors, brakes, gears and speed reducers are built completely by Janette . . . there is no divided responsibility for their design, manufacture or successful operation.
A right angle countershaft reducer is advantageous for most installations, because less space is necessary. The worm, or combination worm and planetary gears, used in Janette reducers, make one of the most sturdy, compact gear drives available, when power transmitted and ratio of speed reduction are considered.
If you want either motorized or motorless speed reducers that are attractive in appearance, easy to install and maintain, efficient, quiet and reliable, you will find these features in Janette machines.
1/30 to 7 1/2 H.P.
.08 to 447 R.P.M.
Janette Manufacturing Company
556 W Monroe St Chicago 6, Ill

Size of wire	Constant	O.D.	I.D.	P	S
.045	7	.315	.225	.1125	.0675
.045	8	.360	.270	.135	.090
.051	5	.255	.153	.0765	.0255
.051	6	.306	.204	.102	.051
.051	7	.357	.255	.1275	.075
.051	8	.408	.306	.153	.102
.055	5	.275	.165	.0825	.0275
.055	6	.330	.220	.110	.055
.055	7	.385	.275	.1375	.0825
.055	8	.440	.330	.165	.110
.063	5	.315	.189	.0945	.0315
.063	6	.378	.252	.126	.063
.063	7	.441	.315	.1575	.0945
.063	8	.504	.378	.189	.126
.071	5	.355	.213	.1065	.0355
.071	6	.426	.284	.142	.071
.071	7	.497	.355	.1775	.1065
.071	8	.568	.426	.213	.142
.080	5	.400	.240	.120	.040
.080	6	.480	.320	.160	.080
.080	7	.560	.400	.200	.120
.080	8	.640	.480	.240	.160
.085	5	.425	.255	.1275	.0425
.085	6	.510	.340	.170	.085
.085	7	.595	.425	.2125	.1275
.085	8	.680	.510	.255	.170
.090	5	.450	.270	.135	.045
.090	6	.540	.360	.180	.090
.090	7	.630	.450	.225	.135
.090	8	.720	.540	.270	.180
.095	5	.475	.285	.1425	.0475
.095	6	.570	.380	.190	.095
.095	7	.665	.475	.2375	.1425
.095	8	.760	.570	.285	.190
.100	5	.500	.300	.150	.050
.100	6	.600	.400	.200	.100
.100	7	.700	.500	.250	.150
.100	8	.800	.600	.300	.200
.112	5	.560	.336	.168	.056
.112	6	.672	.448	.224	.112
.112	7	.784	.560	.280	.168
.112	8	.896	.672	.336	.224
.124	5	.620	.372	.186	.062
.124	6	.744	.496	.248	.124
.124	7	.868	.620	.310	.186
.124	8	.992	.744	.372	.248
.140	5	.700	.420	.210	.070
.140	6	.840	.560	.280	.140
.140	7	.980	.700	.350	.210
.140	8	1.120	.840	.420	.280

MODEL No. 16 "SPECIAL"

CONSTRUCTED AS PER SPECIFICATIONS OF U. S. NAVAL AIRCRAFT FACTORIES

BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D—10" Table; Model E.L.—12" Table. Model No. 14—14" table and heavy pedestals for all our machines.

BEWARE OF IMITATIONS

Our machine carries the Butterfly trade mark.

HARVEY MFG. CORP.

161 GRAND ST., NEW YORK

Phone CAnal 6-5170

Registered U. S. Patent Office

when you want Speed-

when you want power-

...in your job of sanding, filling and rubbing, drilling or screw-driving, you want a Strand Flexible Shaft machine, because a Strand will do it faster, better, and stand up to it longer.

Strand Flexible Shaft machines provide constant speeds with greater operator convenience. Hundreds of attachments easily interchanged—125 types and sizes—models include vertical and horizontal type machines from 1/8 to 3 h.p. Distributors in all principal cities.

Send today for catalog showing complete line

M-5

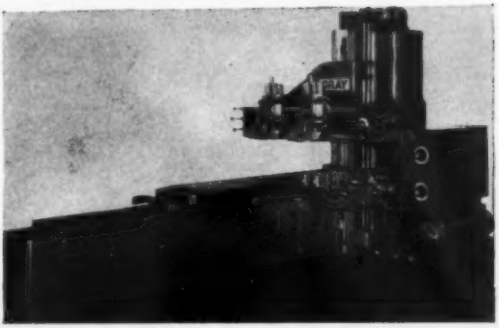
Strand FLEXIBLE SHAFTS

N. A. STRAND & CO.

5016 NO. WOLCOTT AVE. CHICAGO 40, ILL.

WHAT'S NEW IN METALWORKING

NEW GRAY OPENSIDE PLANER CUB



The G. A. Gray Co., Cincinnati, Ohio, manufacturers of Planers, Milling Planers, Planer Type Milling Machines, and Horizontal Boring Machines, has recently introduced the new Gray Openside Planer Cub. This new machine tool is built in 24", 30" and 36" sizes, and provides production convenience and rigidity with tool room precision and versatility.

A broad range of speeds up to a maximum of 300' per minute enables the operator to drive cemented carbide tools at their most efficient speeds. Alternative combinations of main drive motor and planer gear ratio may be furnished that will develop high table pull and thus permit the planing of tough alloy steels at the low speeds required for maximum tool life.

Great precision, highest speeds, and heaviest table loads are reported to be permissable. Prolonged life is said to be assured by Gray Loop Lubrication (patented) which insures uniform lubrication at all table speeds irrespective of length of stroke, or position of table on bed.

The planer is equipped with the new Gray Space Saver Drive and Full Floating Drive Shaft. This new drive is designed to minimize floor area requirements and provide smoother, more efficient drive to the table.

The planer may be completely controlled from the operator's normal working position. The pendant station is provided with buttons which control the forward or reverse movement of the table, either by jogging or automatic cycle. Feed and rapid traverse of either rail head can be controlled at the head itself as well as from both ends of the cross rail. A new design, synchronized mechanical feed unit, which may be instantly set is conveniently mounted in the end of the rail and provides feeds from 0" to 1" in 1/64" increments.

Improved slide, harp, saddle and knee clamps are provided to add to the stiffness and rigidity of the planer. The new design clamps lock against endwise movement and also against vibration. When the clamps are released, correct running adjustment of the mating members is assured.

All heads are equipped with Gray Tool Lifters, which are mechanically operated and permit the taking of fine finish cuts. They are synchronized with the table movement and facilitate the use of relatively brittle carbide tipped tools.

Safety clutches are provided thruout to relieve all mechanisms of excessive strain

SHELDON

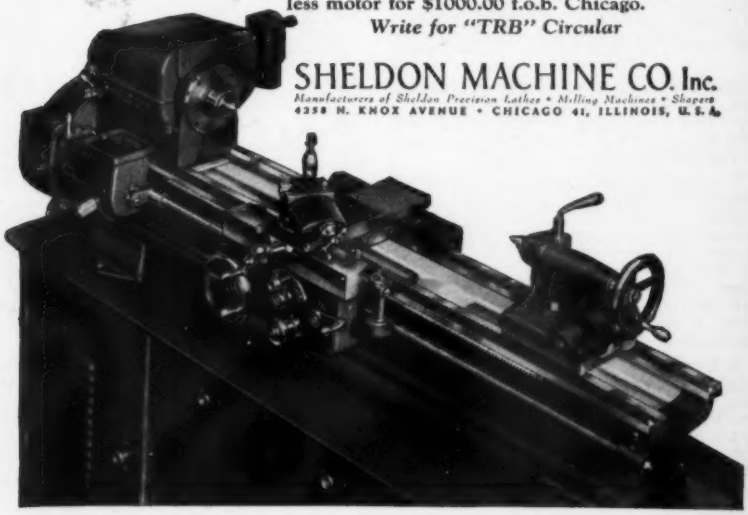
New
TRB—S56
Precision
Lathe
$1000.00

MORE ACCURACY, MOST LATHE PER $

No other moderate priced lathe and but a few of the most expensive, have the "Zero Precision" tapered roller spindle bearings, have beds and ways on lead screws held to such close tolerances. In standard quality tool features, no other lathe can offer as much capacity, utility, and convenience per dollar, as you get in the new Sheldon TRB-S56.

This 11¼" swing, 1" collet capacity, 56" bed precision lathe comes with full quick change gears, a full double walled apron with power longitudinal and cross feeds, 8 spindle speeds (35-1350 r.p.m.) and a fully enclosed double V-Belt underneath motor drive, mounted on a modern welded steel bench, complete, less motor for $1000.00 f.o.b. Chicago.

Write for "TRB" Circular



SHELDON MACHINE CO. Inc.
Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers
4258 N. KNOX AVENUE • CHICAGO 41, ILLINOIS, U. S. A.

and give audible warning of faulty operation.

The patented Gray Table Safety Stop and Synchro Mesh Table Replacer are also furnished as standard equipment.

A large, new style, completely independent side head may be furnished which contains its own feed and rapid traverse mechanisms and controls.

Any length stroke in even 2" increments may be furnished above the 6 foot minimum for any one of the above three sizes of Gray Openside Planer Cubs. Write to Dept. BB for further information.

STEEL STAMP HOLDER

A new, streamlined steel stamp holder is announced by the M. E. Cunningham Co., for marking pipe, tubing, steel plate, and any other round or flat surface.

The holder is made of one solid piece of alloy steel. The bottom of the holder is

shaped out to allow for proper positioning and leveling of stamps on tubing and pipe. Holders are made to suit the number and size of stamps to be used, in single or double line styles.

The new holder embodies Individual Floating Style springs for holding stamps firmly in place, so that they do not fly out on recoil. Stamps can be removed or inserted quickly and easily. The springs fit into individual recesses, which allow them to "float" with the stamps. Springs are held in place by means of a steel plate, which can be removed quickly for replacement of springs.

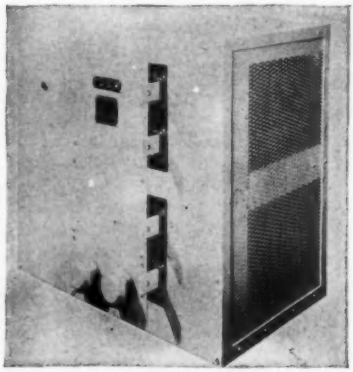
A knurled pipe handle is provided for holding the stamp holder firmly in position. The handle is welded to the end of the holder and includes a machined-out guide or leveler for easier positioning on the piece to be marked. A heat guard can be provided on handle if desired.

No slot is required in stamps. Any size character can be furnished. Recommended sizes range from ⅛" to ⅜". As many as 14 stamps can be handled efficiently in a double line holder. Also special stamps with two or more characters can be furnished for names, tensile strength, grade of steel, etc.

For complete data, write M. E. Cunningham Co., 228 E. Carson St., Pittsburgh 19, Pa.

ELECTROPLATING RECTIFIER

Development of an electroplating rectifier that "has everything" is announced by Wagner Brothers, Inc., Dept. "K", 416



Midland Ave., Detroit 3, Mich., who will handle all sales nationally.

Claimed as without equal as a reliable and economical source of d-c power, the Wagner - Tiedeman Rectifier Assembly employs metallic selenium-on-aluminum cells, which they say have the ability to handle momentary overloads of as much as 1000 per cent of normal capacity. Aluminum back plates in place of steel are slated to provide maximum cooling, and vitally essential low velocity air circulation is provided by three 10-watt fans with a low amperage of only 1.5.

Occupying a floor area of five and a half square feet, the rectifier is 34" high, 36" long, 22" wide, and the all steel welded enclosure is designed so that units may be stacked vertically for higher power.

Complete specifications are available in a detailed engineering bulletin issued by Wagner Brothers, Inc.

CONSTRUCTION OF FUSES

The Inside Story of Trico Renewable Fuses: A new 24-page booklet, extensively illustrated with drawings and charts, showing in detail the value of the "powder-packed" principle in renewable fuse design. It gives helpful information for increasing production by eliminating unnecessary shutdowns—how to get maximum protection for your more expensive equipment — greater safety against fire and accident hazards, etc.

If you use fuses write for folder No. 206-A. Trico Fuse Mfg. Co., Dept. BB, 2948 No. 5th St., Milwaukee 12, Wis.

GASOLINE ENGINE GENERATOR SETS

A series of bulletins describing their products has been issued by Benjamin's for Motors.

Included in this set are separate publications on Gasoline Engine Generator Sets of 1) 300 watt series, 2) 300 watt series, 3) 1000 watt series, and 4) 1500 watt series. Specifications and features of all these units are given in detail.

A battery charging generating set of 300 watt and 6 volt is illustrated and described. The method of operation of this unit is also given. A price list is included for gasoline engine generators manufactured by Benjamin's.

For this series write to Benjamin's for Motors, Dept. BB, 130 Clinton St., Brooklyn 2, N. Y.

NON-SPARKING SAFETY TOOLS

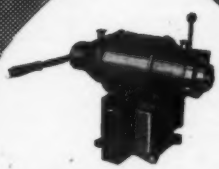
Tools which guard against fires and explosions are listed in a 28-page catalog published by Ampco Metal, Inc., Dept. BB, Milwaukee 4, Wis.

These tools are designed so that they will not spark. This condition is often necessary when working near inflammable gases or mixtures.

These tools include all types of wrenches, hammers, shovels, screwdrivers, picks, saws, and countless other items. Over four hundred standard tools are included.

Most tools are made of Ampco Metal, which prevents sparking. The company describes this metal as a bronze alloy having high tensile strength and controlled hardness. Other tools are made of Ampco Beryllium - Copper, which has great strength. Some are a combination of the two metals.

Prices, weights and specifications are also included.



SCHAUER SPEED LATHES

are production necessities in any plant, for economical, speedy finishing, polishing, de-burring or lapping small parts.

There is a size and type for your particular needs. For complete information

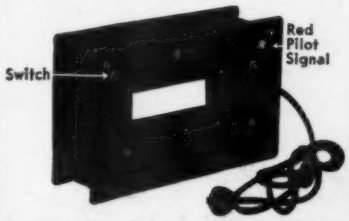
Write for Catalog 440

The Schauer Machine Co.

Originators of Today's Speed Lathes

2064 Reading Rd. Cincinnati 2, Ohio

AMC *Quick* DEMAGNETIZER



A necessity where machine tools are used.

Standard units available and special sizes to order.

Write today for descriptive circular.

ALOFS MFG. CO.

1629 Madison Grand Rapids, Mich.

Universal Stock Reel

The Humm Universal Stock Reel is an essential device for the handling and feeding of coil stock to Power Presses.

1. **Adjustable Reel to fit various sizes of coil.**
2. **Reel is adjustable to suit height of Press.**
3. **Reel can be inclined to any position.**

PRICE $55.00 F. O. B. BROOKLYN, N. Y.

Manufactured By

John Humm Safety Equipment Co.
253 SHEFFIELD AVENUE
BROOKLYN 7, N. Y.

★ THE ★ WONDER CUTTER

The lowest-priced wire and rod cutter on the market. The hardened cutters last indefinitely.

Hand operated. A giant for work, cuts wire and rods up to ⅜-in. round or ⅜-in. square and band iron up to ⅛ in. by 2-in. Adjustable stop for repeated cuts to same length. Large or small, your shop can use a WONDER CUTTER.

Write today for prices.

THE FEDERAL FOUNDRY SUPPLY CO.

4602 East 71st St., Cleveland, Ohio

CUTTING FLUIDS AND COOLANTS

The newest addition to Stuart's illustrated booklet series of technical bulletins, Technical Bulletin No. 5 entitled "Cutting Fluids and Coolants," is a 36-page symposium on cutting fluids as presented at the American Society of Tool Engineers New Era Exposition.

The text consists of four technical papers presented by leading authorities in the cutting fluid field: "What the Tool Engineer Should Know About Cutting Fluids," by W. W. Oldacre, D. A. Stuart Oil Co., Ltd.; "The Testing of Cutting Fluids," by W. J. Wangelin, The Pure Oil Co.; "Cutting Feeds and Speeds," by F. W. Lucht, Carboloy Co., Inc.; and "The Selection of Cutting Fluids," by Joseph Geschelin, Chilton Publications.

Free copies of Technical Bulletin No. 5, and copies of preceding Technical Bulletins are available upon request. Write to D. A. Stuart Oil Co., Ltd. 2739½ South Troy St., Chicago 23, Ill.

ACCIDENT PREVENTION

After two and a half years of research and preparation, the National Safety Council has published its new "Accident Prevention Manual for Industrial Operations," which the Council believes is the most comprehensive treatment of the fundamentals of safety available in one volume.

The 544-page manual, containing 400 illustrations, charts and tabulations, is intended as a handy and authoritative source of accident prevention information for safety directors, safety engineers and foremen. Each of the fourteen major divisions of the book is preceded by a summarizing index for quick location of general topics, while a twelve-page detailed alphabetical index at the back gives access to details.

The fourteen major subjects covered are: plant design and layout, construction and demolition, permanent equipment and facilities, guarding and operating machinery, materials handling and storage, electrical hazards, chemical hazards, fire and explosion hazards, flammable fluids, hand and portable power tools, commercial vehicle operation, personal protective equipment, industrial hygiene, and safety organization and programs.

The manual is available to both members and nonmembers of the Council. Further information may be obtained by writing the National Safety Council, Dept. BB, 20 North Wacker Drive, Chicago 6, Ill.

WELDER FOR ANY METAL

An improved line of standard motor driven flash welders has been announced by Progressive Welder Co., Dept. BB, 3050 E. Outer Drive, Detroit 12, Michigan. These machines have been designed for precision flash welding virtually any metal, including aluminum, for long periods at high production.

Convenience of set-up and operation is pointed out as an outstanding feature. Machine control is from only one position. Platen travel speed for flashing and upset; flashing voltage; amount of upset; die openings, and other necessary settings can be made within a few minutes.

The welders are available in 4 capacities from 20 kva to 150 kva, or they may be battery operated for any welding job that is within the physical capacity of the machine. Upset pressures are 2250 lbs., 4500 lbs., 11,500 lbs., and 19,600 lbs. for the four machine sizes; maximum stock width, vertical fixture is 2", 4" 6" and 8"; and maximum tube O.D., vertical fixture, is 1", 1¼", 1¾", and 2¼".

Standard equipment furnished with all types of flash welders includes clamping fixture with one set of plain dies with hand or foot valve as desired.

Real Cleaning Power
One - Man Portability
with TORNADO

Portable Industrial Vacuum Cleaner

QUICKLY picks up chips, dust or water. Cleans walls, beams, machines, floors, boiler tubes and tops, molds, etc. Powerful - portable. A real one-man unit. Weighs only 40 lbs. Dirt capacity 12 gals.

Write for details and FREE TRIAL OFFER

BREUER Electric Mfg. Co.

5118 N. Ravenswood Ave., Chicago 40, Ill.

TAKE THE DUST OUT OF INDUSTRY

TORNADO

GRAY-MILLS

PORTABLE PUMP UNITS

Use these compact self-contained units as

Coolant Systems for all types of Machine Tools.

Stand-by Pump Units in case your built-in pumps fail.

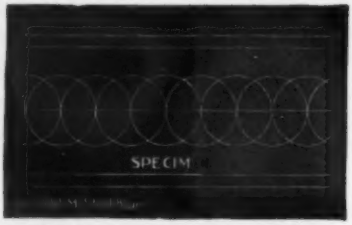
Automatic Die or Stock Lubricators on punch presses.
(Ideal for coil stock)

For hundreds of special applications—circulating or applying liquids of many kinds.

GEAR and CENTRIFUGAL PUMPS
Volume to 43 GPM—Pressures to 50 PSI
5- 12- 38-GALLON CONTAINERS

See your Industrial Distributor or send for Catalog to...

GRAY-MILLS CORPORATION
1948 Ridge Avenue, Evanston, Illinois



DYKEM STEEL BLUE

STOPS LOSSES

making dies & templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

THE DYKEM COMPANY

2301G North 11th St., St. Louis, Mo.
In Canada: 2466 Dundas St. West, Toronto, Ont.

COOLANT PUMP

At last, a dependable, low price coolant pump for machine tools. Constructed of non-corrosive materials. Plastic screen quickly removed for cleaning. Fully guaranteed by old, reliable manufacturer.

With this pump and small pan for fluid you obtain the same results as with expensive equipment.

May also be used for Evaporative Coolers, Fountains, Displays, etc.

Write for Folder

LIST PRICES—POSTPAID

$19.50

JOBBER AND DEALER INQUIRIES INVITED

Evaporative Cooler Kit
This kit provides all of the essentials for Evaporative Cooling: Pump, Float Valve and Switch.
Complete Kit for LIST PRICE **25.50**

AMERICAN METAL PRODUCTS CO.

FORT WORTH 9 TEXAS

"MICRO CHUCK" LITERATURE

Whitman & Barnes Dept. BB, Detroit 16, Mich., has recently published a circular which describes, illustrates and lists the so-called "Micro Chuck." In brief, it consists of a chuck and collet, the latter being adjustable to absolute concentricity. Two sizes of collets are available, the smaller for diameters .005" to .025": the larger for diameters .020" to .040".

The "Micro Chuck" is designed and made especially for use with Micro Precision Twist Drills and Watchmakers' (Flat) Drills also listed in the above circular. These drills are made in right hand and left hand in sizes from .15 M/M (.0059") diameter to 1.00 M/M (.0394") diameter.

The circular can be obtained when requested by writing on your company's letterhead.

MACHINES READY FOR DELIVERY

A bulletin giving important information on new machine tools has been announced by Botwinik Bros. of Mass., Inc., 8 Sherman St., Worcester 1, Mass. This bulletin lists types of machines which are available, and the prices and specifications of them. These include lathes, buffers and polishers, grinders and metal cutting band saws.

Their Bradford lathe is the result of 106 years of production. They are available in any bed length. Delivery of the lathes are promised within thirty days. The features which they believe to be outstanding points of interest are listed along with an illustration.

Buffers and Polishers are available up to 7½ hp, with two or four ball bearing, spindle lengths up to 65", bench or pedestal type and any height from floor to center of spindle. Immediate delivery from stock is promised for this line.

Grinders are available up to 7½ hp with 12", 14" and 18" wheels. These are also promised for immediate delivery.

Copies of this bulletin (No. 8) are available upon request.

PRICE & SIZE LIST

Sizes under A.S.A. standards and prices on Drill Jig Bushings are now available in a newly printed booklet from Ex-Cell-O Corporation.

Bulletin 11882-B, containing this and other important bushing information, will be sent upon request to Dept. BB, Ex-Cell-O Corp., Detroit 6, Mich.

MILLING EQUIPMENT

A series of bulletins has been published by the Kempsmith Machine Company. These cover some of the products produced by them.

The following are a few that are covered:

1—Vises. These include standard plain vises, heavy duty plain vises, or standard and heavy duty swivel vises. The heavy duty vises are said to have consistently held 15 hp cuts.

2—Vertical Milling Attachment—This is stated to be ideal for such operations as face milling, keyseating, heavy die sinking, large cam milling, short lead spiral or thread milling, and continuous rotary milling. A heavy duty attachment is also available.

3—Circular Milling Attachment—The outside edge of the table is graduated in 360 degrees. A center hole located work mounted on a mandrel.

4—Hi-Speed Universal Milling Attachment.

5—Heavy Duty Universal Milling Attachment.

6—Slotting Attachment.

7—Arbors and Accessories—These are for all types of milling machines. Several types of collets and centering plugs are described and illustrated.

Each bulletin is dedicated to a particular type of product.

For these bulletins and literature on other products of this company write to Kempsmith Machine Co., Dept. BB, Milwaukee, Wis.

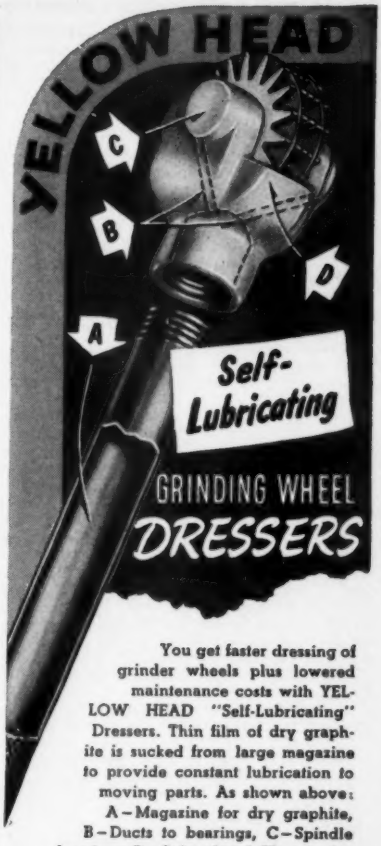
OIL CIRCUIT BREAKER

The many features of the Allis-Chalmers FZO-150 Unitop frame-mounted fabricated, three-pole, high voltage oil circuit breaker in ratings from 15,000 to 46,000 volts are described in a new illustrated 12-page bulletin.

In addition to a concise coverage of this completely fabricated, weatherproof, outdoor breaker, this bulletin includes outline dimensions with weights and oil volumes for reference.

Important standard features covered include the Ruptor, an interrupting device which assures high-speed, trouble-free, low maintenance circuit interruption, pneumatic operation which when used in conjunction with the Ruptor permits 20 cycle reclosing, and an all-fabricated, one-piece rigid top frame, which provides greater permanency of adjustment.

The bulletin, 71B6421, is available from Allis-Chalmers Mfg. Co., Dept. BB, Milwaukee 1, Wis.



You get faster dressing of grinder wheels plus lowered maintenance costs with YELLOW HEAD "Self-Lubricating" Dressers. Thin film of dry graphite is sucked from large magazine to provide constant lubrication to moving parts. As shown above: A—Magazine for dry graphite, B—Ducts to bearings, C—Spindle bearings, D—Safety hood. There's also a plain type and selection of cutting heads available.

CITY MACHINE CO., DEPT. MT

PIQUA, OHIO

Write for complete details and prices

BROACHING OPERATIONS COMBINED

Three separate broaching operations plus one slitting operation were recently combined on a single Colonial Broach Company Dual Ram broaching machine to completely machine the big ends of automobile connecting rods.

Operations required were:

1—Machining of bolt bosses

2—Splitting of cap from rod

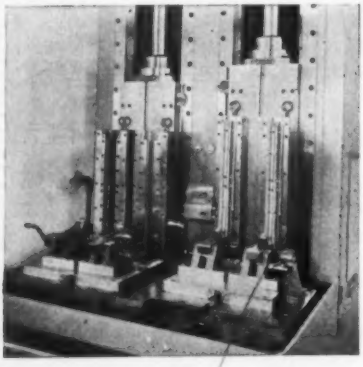
3—Broaching parting faces and ID of rod big end

4—Broaching parting faces and ID of cap

The manner in which these operations were worked out on the dual ram is illustrated by the parts illustration. At the extreme left is shown the connecting rod as it comes from the forging and cleaning operations, except that the pin end has been broached and an oil hole drilled. Note that the big end bore is elongated to allow for the metal cut off in the slitting operation.

Next to this is the rod as it looks after being broached on the first—farthest left—station on the Dual Ram shown in other illustration. Note that the bolt bosses have been broached and that the slitting operation has been started.

The third view from the left shows the rod after it leaves the second station on the Dual Ram. The slitting operation has been completed. Reason for splitting up the slitting operation in this manner is to distribute metal removal evenly. The depth of the metal at the slit is rather large to handle with a single broach. If a single broaching operation were used for this, the broach would either have to be quite long—slowing up all operations and increasing machine size, or the stop per tooth would have to be quite large—with resultant decrease in broach life.



Up to this point, the broaching operations have all been performed by the left hand ram of the Dual Ram machine. The connecting rod now goes to the left station and the cap to the RH station of the right hand ram. Here, the bores are broached as well as the parting faces. Note that the latter meet with a tongue and groove type of joint. This has the advantage of relieving the connecting rod bolts of side stresses and makes for a stronger connecting rod assembly.

It is necessary of course to remove considerable metal from the parting faces in this operation—on both cap and rod—to machine this tongue and groove.

The connecting rod is now ready for drilling of bolt and oil holes.

It might be noted that all broaches are built up from inserts, all of which are individually replaceable, thus keeping broach maintenance and replacement cost at a low level. The Dual Ram Machine is a 15 ton with 66″ stroke. Since the machine operates on a continuous cycle, broaching and return speeds of the ram are identical—one ram broaching while the other is returning. Production is around 150 complete pieces per hour at 100 per cent efficiency.

AUTOMATIC MARKING

An automatic marking machine designed to speed up production is the subject of a bulletin published by the Defiance Machine and Tool Co., Dept. BB, 1920 S. Vandeventer, St. Louis 10, Mo.

This machine is known as the "Automark". It has automatic control for production and finger tip control for tool work. It is adjustable to all types of materials from fibers to tool steel. Parts or material ranging in thickness from .001″ to 6″ or larger can be marked with impression depths from .0005″ to .015″ or more.

Typical examples of the types of materials and parts on which work was done are included.

BRAND NEW PRECISION ROTARY TABLES

9"—$ 97.00
12"— 160.00
15"— 185.00
18"— 220.00
18"— 350.00 Extra Heavy Duty
21"— 500.00 Extra Heavy Duty
25"— 590.00 Extra Heavy Duty

OUR ROTARY TABLE WILL TAKE THE PLACE OF A COSTLY FIXTURE. IT IS USED FOR ALL KINDS OF WORK ON MILLING MACHINES, SHAPERS, DRILL PRESSES AND HORIZONTAL BORING MILLS.

WE CAN ALSO FURNISH DIVIDING ATTACHMENTS.

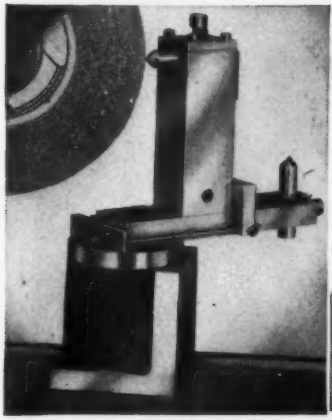
SEND FOR LITERATURE AND DETAILS.

IMMEDIATE DELIVERY

SEND FOR 220 PAGE FREE CATALOG

LAFAYETTE TOOL & SUPPLY CO.
128 LAFAYETTE STREET NEW YORK 13, N. Y.

PRECISION DRESSING AT LOW COST
with the "FORM-MASTER"* ANGLE & RADIUS DRESSER



A sturdy, quality instrument. Designed by form-grinding specialists for accurate dressing of both angles and radii at low cost. Easily set with micrometer for radii—and with protractor or sine-bar for angles. All parts (except base) hardened and ground to close tolerances. Sealed ball-bearings for long-life and accuracy. Two 1/3 ct. diamonds and case included—$150.00 complete.

Compare these features:

- *Large range*
- *Chatterless and dustproof*
- *.0001" accuracy obtainable*
- *Simple to operate*
- *Reasonably priced*

*Reg. U. S. Pat. Off.

Write for complete information.

J&S TOOL CO. 477 Main St., East Orange 2, N. J.
Manufacturers of "Fluidmotion" Form Dressers

LINE OF OIL FILTERS

The Briggs Filtration Company has issued a new booklet in which they describe their series of Oil Filters. This is a new standard line which they have begun to manufacture.

This company reports that they have a filter and refill element for every oil maintenance problem. They are designed for specific operating conditions, various capacities and all degrees of contamination. The filters are made of all weld steel cases, and are hydrostatically tested. The relief valve is built-in.

A diagram of the Briggs Filter is shown with the name and description of all the main features written along side. The method of operation is also given. Many outstanding points of advantage are claimed for this line of filters.

For each type there is a chart giving the needed specifications.

For a copy of this booklet and information on the various products of these manufacturers write Dept. BB, The Briggs Filtration Co., Bethesda 14, Maryland.

ROTARY GRINDING ATTACHMENT

A bulletin has been published which describes the Sta-ga-Co Rotary Grinding Attachment for surface grinders. This bulletin gives many recommended uses for the attachment as well as a diagram showing the parts.

It has a chuck capacity of 0" to ½". Its weight is approximately ten pounds. The dividing head has 12 divisions, permitting 1, 2, 3, 4, 6 or 12 flats concentric with outside diameters. Accuracy within four minutes is claimed.

The spindle has a ⅜" hole straight thru to permit grinding ends of longer pieces. It may be locked in any position. Bearing is adjustable for wear.

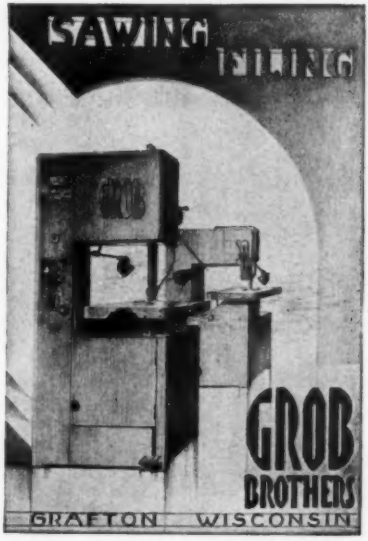
This product is manufactured by the Star Gauge Company. The sales distributers are Gale Forssen Co., Dept. BB, 64 Monmouth St., Springfield 9, Mass.

FELT FACTS

If you use products which contain felt you will be interested in a publication issued on that subject. This is entitled "Felt Facts." The publication and the data used has been authorized by the Felt Association, Inc. Copies may be had from Korbel & Colwell, Inc., Dept. BB, 480 Lexington Ave., New York 17, N. Y.

Standard mechanical roll felt specifications are given in table form along with many other facts of importance.

GRANT RIVETERS
will PEP-UP
your
NEW
Production
JOBS
A great help in War Production, these GRANT Riveters are available in Noiseless Spinning and Vibrating Hammer types. Also Vertical and Horizontal Multiple Spindle Spinning Machines.
THE GRANT MFG. & MACHINE CO.
C E Station, Bridgeport 5, Conn.



STUD WELDING DATA BOOK AND CATALOG

Designed to provide factual information on the use of automatic stud welding, a new 36-page data book and catalog has been published by Nelson Sales Corporation, Dept. BB, Lorain, Ohio.

The Nelson automatic stud welding process, equipment and studs are fully described and illustrated. Complete information on designing is given, together with full specifications and physical properties data on Nelson flux-filled studs. A final section of the book is devoted to a description of typical stud welding applications in automotive, contracting and construction, boiler and tank, railroad, electrical equipment manufacturing and general metal-working fields.

FOUNDRY MECHANIZATION

A wide range of mechanized equipment for the modern foundry designed to produce better, lower cost castings, is described in a new 20-page illustrated Allis-Chalmers bulletin.

The booklet, "Foundry Mechanization," provides a revealing insight into equipment used in a wide range of foundry operations, from light and heavy jobbing to mass production.

Described are "Foundromatic" shakeouts that stand up under continuous production, sand conditioning and reclaiming machinery, motors, drives, controls, cupola blowers, arc furnace control and accessories, mercury arc converters—so complete a line of foundry mechanized equipment as could be produced only by the builders of the world's widest range of major industrial products.

Of specific interest is the description of a new portable "Foundromatic" shakeout and a heavy-duty sand scrubber for use with a wet reclamation system.

The bulletin is available upon request from the Allis-Chalmers Mfg. Co., Dept. BB, Milwaukee 1, Wis.

CROZIER PRODUCTS

New illustrated 12-page catalog describes the features and operation of Crozier Time-Saving Tools, including various models of the Vacuum-Grip Speed Lathe for odd shaped parts that cannot be held by chuck or collet, Tool Post Turrets equipped with cutting-off tool and holder, Collet Attachments, Collets and Surface Plates. Write for Catalog 46-1, Dept. BB, Crozier Machine Tool Co., 684 North Prairie Ave., Hawthorne, Cal.

Grobet
ROTARY FILES

The Complete Line for Every Industrial Purpose

GROBET FILE CO. of AMERICA
421 Canal Street New York 13, N. Y.

FAST

WITH HERCULES HOLDERS AND TYPE

WRITE FOR

1 ILLUSTRATIVE LITERATURE AND PRICE LISTS
2 NEW BROCHURE ILLUSTRATING OVER 100 MODERN MARKING TOOLS AND MACHINES

CONSULT THE ORIGINAL "MARKING SPECIALISTS" FIRST!

The ACROMARK Company
15 Merrell St.
ELIZABETH 4, NEW JERSEY

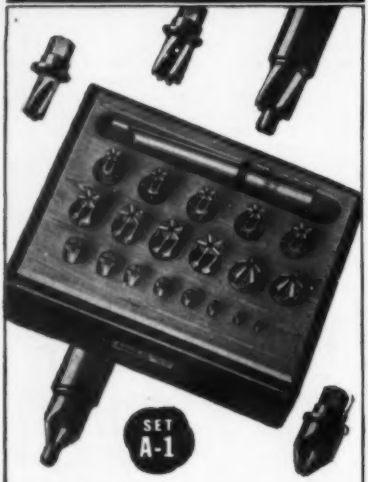
These efficient tool kits speed up your counterboring and spotfacing work, by putting a wide range of cutter and pilot combinations within easy reach. Seven sets from which to choose.

COUNTERBORE SETS

Write for Folder and Prices

THE GAIRING TOOL CO.

Roosevelt Park Box 478, Detroit 32, Mich.



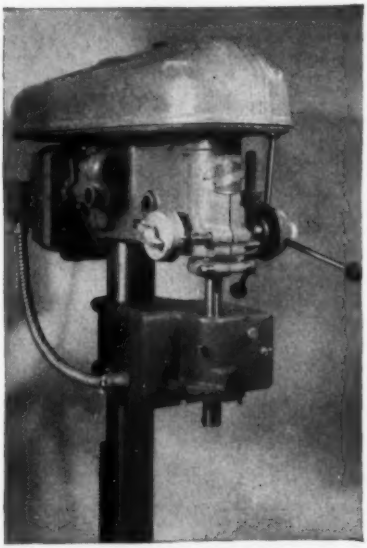
This set includes: one type A-1 holder; nine cutters from ¼" to ½"; eight pilots from ⅛" to ⅜"; two ½" countersinks, one 70° and one 82°, in hardwood box with hinged cover.

GAIRING TOOLS

PRECISION TAPPING ATTACHMENT

A new model of the Rotorex Precision Tapping Attachment, which is applicable to all popular model drill presses and gives Class III threads with unskilled labor in 0-80 to ⅞" sizes, is announced by the Douglas Machinery Co.

The new Rotorex provides positive, automatic control of lead to assure pre-



cision tapping, as well as accurate control of depth to a tolerance of .010". Lead screws are hardened and precision ground, well lubricated, and fully enclosed for protection from dirt. Other features include instantaneous emergency reverse, complete automatic cycle, and foot control which leaves operator's hands free for loading.

Complete installation can be made in ½ hour or less. Changeover from tapping to drilling or vice-versa can be made in 5 minutes. The attachment requires little more vertical space than the ordinary tapping chuck, and is simple in construction and operation.

Prompt shipment can be made upon receipt of order. Informational catalog and complete details will be sent upon request to Douglas Machinery Co., 150 Broadway, New York 7, N. Y. Dept. BB.

COMBINATION MACHINE

A bulletin has been issued describing and illustrating the new Chip Breaker and Diamond Finishing Grinder of the Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo 54, Mich. This is known as Model CB-77.

This machine provides chip breaker grinding on one side and diamond wheel finishing on the other. The spindle is driven by a V-belt from a ½ hp motor in the base. The spindle speed is 3150 rpm.

For further information on this and many other products write to the manufacturer.

TEMPERATURE CONTROL

The Wheelco Instruments Co., Dept. BB, 847 W. Harrison St., Chicago 7, Ill., has issued a 20 page Educational Bulletin No. 5 on "Automatic Temperature Control Systems."

Charts, tables and diagrams explain measurement and automatic control and the selection of proper control systems for process applications. "Thermocouples, their Placement and Hints Governing Their Use" and "Selection of Thermocouple Protecting Tubes" are treated separately. A.S.M.E. terminology referring to processes and automatic control is also listed.

The condensed presentation of "Automatic Temperature Control Systems" makes the Wheelco Educational Bulletin No. 5 a valuable guide for anyone interested in process instrumentation.

ROTARY PUMPS

Ellipse Rotary Pumps are described in a new bulletin issued by the Ellipse Corp., Dept. BB, 20 S. Clinton St., Chicago 6, Ill.

The series S—125 is illustrated and specifications for it are included. This series has a capacity of 2.5 gallons per minute, a pressure of 1000 psi, and a vacuum of 26". The weight is approximately five pounds.

The manufacturers of these pumps state that they can be used to pump practically any substance that can be moved, from mayonnaise and very light lubricants right down the line to boiling water or light gases. There is constant uni-directional flow following the motions of the vanes and rotor about a constant center. Motion is circular.

Several other series are available from this company. For information on these pumps or any pump problems that may prevail write directly to the Ellipse Corp.

TO KEEP - - - -

MACHINISTS FROM WASTING TIME

You can eliminate many hours of highly-paid Machinist's time from your payroll, if you will let these men use the Jackson TIME-SAVING Vise. It cuts out the time they are forced to waste hunting for Bolts, Clamps, Angle-Plates, Parallel-Strips, etc., when "rigging up" work on the Drill Press, Miller, etc. Furthermore, you can eliminate the simultaneous loss of output and overhead expense incidental to having your productive machine idle during the "rigging up" process. The four-side turret jaw and supplementary jaws enable the vise to hold instantly the thousand-and-one shapes that arise in a Machine Shop.

SUPPLEMENTARY JAWS HELD REGULAR WORK
THE REAR JAWS HOLD WORK PERPENDICULAR TO VERTICAL
WORK HELD PREVENTS INTO BASE OF VISE
HIGH DRILLING

Send for Bulletin No. 23-B Describing the

JACKSON TIME-SAVING VISE

BROWN ENGINEERING CO.

126 N. THIRD ST. READING, PA.

FOR ASSEMBLY, BENDING
★ AND BROACHING ★
1883 - GREENERD - 1943

THE ORIGINATORS
OF THE
ARBOR PRESS
IN 1883

Precision
Work in Manufacturing

An Arbor Press for every need, ranging from ¼ to 30 tons capacity, both hydraulic and mechanical types. Write for Catalog G.

GREENERD ARBOR PRESSES
NASHUA, NEW HAMPSHIRE, U.S.A.
EST 1883

ELECTRONIC CONTROLS

Electronic motor controls for industry are described in a bulletin issued by the Electron Equipment Corp., Dept. BB, 917 Meridian Ave., South Pasadena, Calif.

This company reports that the controls are available now in full range, adjustable, stepless design. These utilize current from a-c lines to drive all makes or sizes of standard d-c motors.

These units are said to provide all the advantages of a d-c motor from a-c lines.

POWER RELAYS

A new 20-page catalog No. 6 featuring Medium Duty Power Relays has just been issued by Signal Engineering Manufacturing Co., 154 W. 14th St., New York, N. Y. Catalog available upon request.

Small Power Relays and Medium Power Relays are described and illustrated, together with other pertinent information regarding Method of Selecting Relays, Operating Characteristics, Contact Circuit Arrangements, Contact Ratings and other important data.

BULLETIN ON TEMPERING

Tempering in Surface Combustion Standard Rated Furnaces is described in new 4-page bulletin No. SC-133, just issued by Surface Combustion Corp., Dept. BB, Toledo 1, Ohio.

The bulletin illustrates and describes different types of furnaces recommended for tempering of various kinds and shapes of ferrous objects. Heat flow in forced convection furnaces and the principle of Conjecto-Firing are illustrated by cut-a-way drawings. Furnaces shown include Forced Convection, Oven and Pot types.

A table giving the effects of tempering temperatures on hardness is included.

SLIDE-OFF DECALS

Slide-off decals are described in a very attractive brochure published by the Palm Bros. Decalcomania Co., Dept. BB, Regent and Lexington Aves., Cincinnati 12, Ohio.

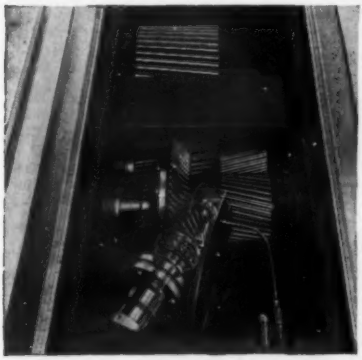
Many samples of possible uses of these decals for name plates, trade marks, instructions, etc., are shown in this multi-colored publication.

These are made in any size or shape and in any color or combination of colors. They may be applied to any commercial surface, including glass, metal, wood or plastic. They are reported to be made to withstand hard use.

The advantages of this type of product are also described in this brochure which may be had upon request.

NEW DRIVE UNIT FOR DOUBLE HOUSING AND OPENSIDE PLANERS

The Gray Space-Saver Drive, (Patent applied for) as the name implies, saves valuable floor space by placing the driving motor behind the column or housing and close to the planer bed. This location of the motor also protects it from the dust and grit produced by the cutting tools and so reduces motor maintenance; further, fewer gears, shafts, and bearings are needed to transmit the power than is necessary in the conventional drive arrangement.



The hardened and lapped hypoid gears, in combination with the helical gears and table rack, afford maximum load carrying capacity with enduring smoothness of motion. The hypoid pinion as shown is rigidly mounted between anti friction bearings.

The motor drives the simplified gear train thru a large diameter, tubular "floating shaft," having flexible connections at both ends very similar to the propeller shaft of an automobile. These flexible connections have no backlash and require no lubrication or other attention.

The "floating shaft" construction eliminates vibration and noise due to misalignment of the motor, even if considerable misalignment exists. It also eliminates the strain and wear of the bearings and the multitude of other troubles incident to the old short-coupled, single flexible coupling design.

For complete information write, The G. A. Gray Company, Department H, Cincinnati, Ohio.

for Better Belt Joints

To keep belts in service longer, use only GENUINE Clipper Belt Hooks applied with Clipper Belt Lacers.

use Clipper Belt Hooks

Clipper Hooks are made of the finest quality wire—BETTER than ever before—produced for our exclusive use. Hooks hold with firm, sure grip — give longer satisfactory service.

and Clipper Belt Lacers!

The Clipper No. 9 Portable Lacer laces belts up to 6 inches wide in one quick, easy operation. Under powerful pressure hook legs are embedded flush with the surface of the belt and points clinched, making a perfect joint. Phone your mill supply jobber for a demonstration!

CLIPPER BELT LACER COMPANY, Grand Rapids 2, Michigan, U.S.A.

NUMBERALL

Rotary Stamp

(Patented)

Single wheel, for stamping on brass, aluminum, soft steel, plastic and wood, with a single hammer blow. All figures on 1 wheel, entire alphabet on 2. One stamp replaces 12 individual hand stamps. Characters from 1/16" to 3/8". Also with shank for press.

Bulletin BB-1H.

Model 1H

NAME PLATE DETAIL PRESS

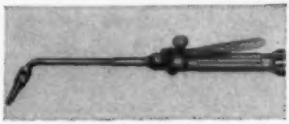
Model 40 is for stamping details on name plates. Eliminates irregular and unsightly stamping on name plates, tags, etc. Available in 1/16", 3/32", 1/8", 5/32" size characters. Dials contain all the letters and figures, diagonal line, and sign, dash, period. No experienced operator required. Steel, zinc, brass, fiber, etc., can be indented with a name or number.

Write for Bulletin BB40

NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.

WELDING TORCH

Weldit Welding Torch—W-46 now embodies a new feature that permits of wider operating range and easier handling—the full "handle length" lever makes it



possible to shut off or release gas with only finger-tip pressure. This feature is combined with the built-in Automatic Gasaver.

The manufacturers state that carefully checked tests under ordinary working conditions have shown that W-46 will effect a gas saving of $4.80 per man per day. It is also claimed that tests with ordinary torches also prove that only 20 seconds of flame time was actually used in welding—a 2/3 gas waste that can be saved.

Descriptive literature will be mailed upon request to Dept. BB, Weldit, Inc., 990 Oakman Blvd., Detroit 6, Mich.

OUR EFFICIENT TOOL DESIGNING

means

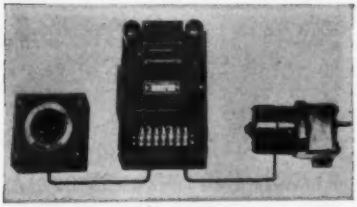
better production at a lower cost

Efficient tool designing in post-war's competitive production is a "must". Our experience guarantees you tools—designed for economy of operation, resulting in your increased production at lower costs.

COLUMBUS DIE • TOOL
and Machine Co.
930 CLEVELAND AVE., COLUMBUS 1 OHIO

"PACKAGED" REMOTE SERVO CONTROL

This illustration is of the "Synchro-Link." It is a remote positioning servo control that will position one or a number of distant motors according to the setting of the control transmitter. It is reported to do the job quickly and accurately, within better than one percent of the



full range. It is designed so that it is independent of the load.

The manufacturers state that this is the first unit of its kind to be used with fractional or integral horsepower motors. The same standard elements are adaptable to a great number of applications, such as control of speed transmissions, valves, dampers, machine tools, etc.

Two adjustments are provided for this unit:

1—A sensitivity control to allow for adjustment of accuracy.

2—An anti-hunting control for adapting the characteristics of the system to the different values of inertia of motors and loads in various applications.

The Synchro-Link Controller contacts will handle 15 amp, 110 V, a-c, or 10 amp, 220 V, a-c. Motors up to 1/10 hp can be connected directly. Motors from 1/10 to 35 hp use standard magnetic reversing starter.

All elements are standard and interchangeable. Several units can be connected so that a single master control operates all slave units.

The motor is not supplied as part of the unit, but any reversible motor can be used. This allows for freedom of selection of the motor most suitable for the application.

Illustrated literature describing this product in more detail may be had by writing directly to the manufacturer, Yardeny Laboratories, Inc., Dept. BB, 105 Chambers St., New York 7, N. Y.

STREAMLINED 4-SPEED REAMER DRIVER

Complete with motor . . . 4" four-jaw universal machine tool chuck and foot control switch. Capacity from ¼" to 1½" reamers. Four speeds . . . 30—45—72 and 115 RPM. Higher speed ranges available. Eliminates handwork. Speeds production. Mail your order today. The new Greaves streamlined reamer-driver will come your way—*pronto!*

THE *Greaves* MACHINE TOOL CO.
2013-10 R.D. Eastern Ave.
Cincinnati, Ohio

WELD WITH TWECO

TWECOTONG Electrode Holders are made in 200, 300 and 500 ampere sizes. Fully insulated, simple, efficient. All parts replaceable. Insulation almost indestructible.

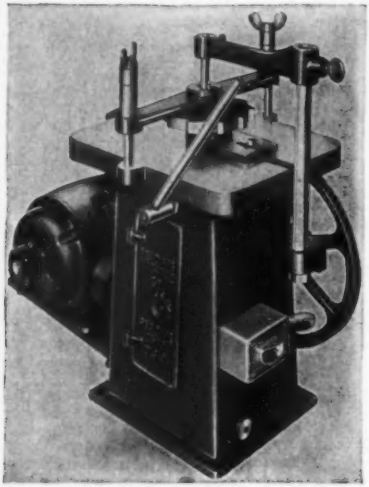
Redhead Ground Clamps come in 125, 300 and 500 amp. sizes. Rugged, efficient, low cost.

Free 12 page TWECOLOG shows Holders, Clamps, Connectors, Terminals and Lugs for Electric Welding.

TWECO PRODUCTS

Manufactured by
TWECO PRODUCTS COMPANY
1048 E. English Wichita 1, Kans.
In Canada: G. D. Peters & Co. of Canada, Ltd., Montreal
Export: Henry Jahn & Son, 7 Water St., N. Y. C.

TO RAISE PRODUCTION CUT COSTS — THE READING BROACH KEYSEATER



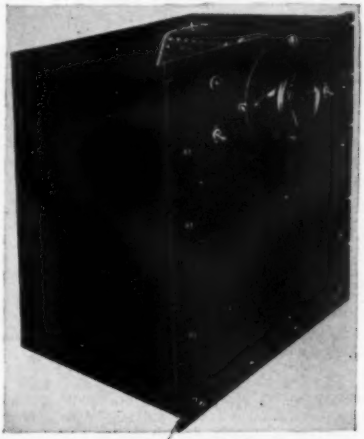
The Reading Bench Machine does not require bushings or guides. No other machine like it. Very fast—capacity from ⅛ to ⅜ cutter. Low first cost—prompt delivery.

READING MACHINE CO.

READING (CINCINNATI) OHIO

D-C POWER SUPPLY

In addition to a-c voltage control apparatus, The Superior Electric Company offers a line of d-c power supplies.



Pictured is a 0-3000 volt model. This SECO d-c power supply has been designed for continuous duty, small regulation and easily adjusted output voltage. The maximum d-c output current is .5 amperes. It operates from a 115 volt, single phase, 50/60 cycle source.

The power supply uses a full wave bridge rectifier consisting of four type 866/866A tubes. A time delay relay is provided which allows the filaments to be adequately heated before high voltage is applied. Line fuses are incorporated for protection against possible overload conditions. All major components are either potted in metal enclosures or are hermetically sealed.

As shown in the illustration, the d-c power supply is supplied for mounting in a standard 19" relay rack panel. An external metering panel is available. Three controls and two indicator lamps are mounted on the power supply panel. These are the a-c line switch with indicator lamp; high voltage primary switch with indicator lamp; and the Powerstat variable transformer control.

Further information can be secured by writing The Superior Electric Co., 144 Church St., Bristol, Conn.

KUTMORE HIGH SPEED ADJUSTABLE HOLLOW MILLS

16 standard sizes—Cutting capacities 1/32" to 2". Also specials made to order.

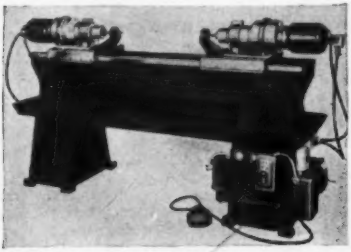
The KUTMORE is the only hollow mill with built-in micrometer dial adjustment. Prompt delivery — even on specials. *Write for Catalog No.* 15.

CARL WIRTH & SON, 1625 Clinton Ave., N, Rochester 5, N. Y.

CENTERING MACHINE AND DRILLING HEADS

The Robotrill Automatic Cycle Centering Machine and Robotrill Drilling Heads are reported to reduce the human margin of error by more robot-like control of centering and drilling.

The centering machine, claimed to be the fastest on the market, can be provided with either general or special work fixtures, can center pieces up to 36" or longer, with precision accuracy. This machine can also be adapted for two-way drilling when not in use on centering operations.



The drilling heads embody robot-like control of the drilling operations in such a way that precise, clean-bottom drill holes occur with every drilling.

This is made possible in several ways—micrometer adjustment of the spindle, depth control to within .002", even pressure on the spindle during the work stroke by centrifugal force of positive driven balls and release of the drill spindle without shock.

Robotrill heads are stated to operate in any position or angle, and may be installed in any special machine where standard mounting brackets cannot be used by boring a hole to fit the body of the head. They may be installed on automatic screw machines for drilling cross holes in parts being machined.

In construction, Robotrill heads are self-contained units, using standard motors and high grade precision ball bearings. Since all parts of the head are keyed together, only the rear thrust bearing and the front spindle bearing are subject to wear.

Robotrill heads are reputed to eliminate 50% of tool breakage.

The Robotrill Centering Machine and Heads are stocked by Dept. BB, Klatt & Wood Co., designers and distributors of special machinery, 329—20th Street, Toledo, Ohio.

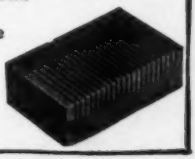
McMAHON'S *Magnetic Blocks*

V-100 Magnetic Block

30-45-60° Angle, with Brass Separators, Brazed in place. Size 2½"x2½"x3½" long. Priced $35.00 each.

K-125 Magnetic Parallels

Sold in Sets of Two Blocks, with Bakelite Separators. Size, 1-3/32"x2¼"x4" long. Price, $14.05 per Set.



Write for Descriptive Literature.

FRANK McMAHON COMPANY

142 S. JUNE ST. DAYTON 3, OHIO

haskins
FIRST...
if you want
tools that LAST!

These days, the lasting quality of Haskins Flexible Shaft machines is minimizing production difficulties and delays wherever they're at work. Many 20-year-old Haskins portable tools are still on the job; and their usefulness covers everything from die polishing and buffing to heavy duty sanding and rotary filing!

It's an asset, this Haskins quality—an asset that stands ready to help you.

Send for full information.
R. G. HASKINS COMPANY,
2645 W. Harrison St.,
Chicago 12, Illinois.

haskins
FLEXIBLE SHAFT EQUIPMENT

AUTOMATIC INSPECTION SYSTEM

An automatic inspection system for small parts has just been announced by Mr. Herbert C. Guterman, Senior Vice-President and General Manager of Arma Corp., Brooklyn, N. Y., as the company's first offering to private industry following a 25-year period during which it devoted its services exclusively to the development and manufacture of a wide range of electro-mechanical precision instruments for the U. S. Navy. The inspection system is an electronic light-indicating comparator with automatic classification of parts up to 1½" sphere maximum size. This equipment inspects, counts and sorts parts and places them in good and rejected groups. In conjunction with a range of precision components, also furnished by this company, it offers inspection stations to meet the needs of every type of industry . . . adaptable for both manual and hopper feeds . . . no thought or skill required . . . broad range of adjustable tolerances, and speeds up to 7,000 pieces per hour . . . change over from one part to another or from one dimension to another, is a matter of minutes. For further information write Arma Corp., Brooklyn, N. Y., Dept. BB.

SOUTHERN MACHINERY AND METALS EXPOSITION

"The Industrial South" will be the theme of the Second Southern Machinery and Metals Exposition to be held at the Municipal Auditorium in Atlanta, Ga., April 14-17, according to R. S. Lynch, Exposition President. Manufacturers from California to the Atlantic Coast, and from Minnesota to the Gulf will exhibit their industrial equipment and products.

More than 150 companies will be represented at the Exposition.

Exhibits will range from displays of small tools and processing equipment to mechanized products for foundries and textile manufacturing. Electronic devices, materials handling equipment, castings, and precision machine work will be in prominence.

There will also be an Industrial Forum in conjunction with the Exposition, during which Southern industrial experts will discuss such matters as plant layout, welding, labor relations, sales distribution and problems pertinent to Southern manufacturing operations.

Exposition offices are located at 267 East Paces Ferry Road, N. E., Atlanta 5, Georgia. Reservation requests should be directed to this address.

SAPPHIRE TIPPED HONING AND BURNISHING TOOL

The development of four new sapphire tipped honing and burnishing tools has been announced by Sapphire Products division of Elgin National Watch Co.

Two of the new tools are designed to fit into lathes or drill presses and are used with water as a coolant. One of them, the machine burnishing tool shown at upper right, already has proved its efficiency for sizing bearings, according to Roger F. Waindle, general manager of the division.

Waindle mentioned three advantages of the sapphire tipped tool over steel burnishing tools. They are:

1—Like the sapphire tipped gages the burnishing tool won't wear out but holds to size and remains strictly accurate.

2—It does not mark or score the bearing.

3—Because sapphire is a non-metallic and completely non-porous it does not seize on or tear any portion of the bearing surface and does not close the pores of pre-lubricated powdered metal bearings.

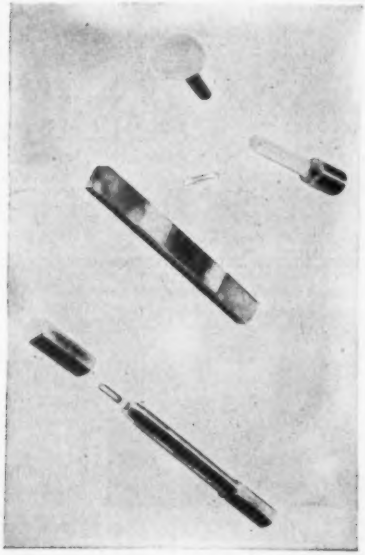
"In contrast to the steel burnishing tools the sapphire tipped product automatically sizes and burnishes bearings thru its rotation," Waindle said. "It is chucked in a high speed drill press or lathe to produce the rotation."

Another burnishing tool, (upper left) is designed to apply very high finishes to outside surfaces and counter bores. Like the first it is a one-end tool and usually is fitted into a lathe. The two tools are made in diameters from .200" to .700".

Two sapphire tipped hand burnishing tools which feature double ends are included in the current development. One of them (bottom) has solid sapphire members protruding, and a round aluminum barrel with hexagon caps to protect the ends. It is used chiefly for small parts burnishing and honing, many thousand already being employed in the watch and instrument manufacturing field.

The other (second from bottom) is a flat double end honing and burnishing tool with solid sapphire inserts of two different grits. It is used for larger or heavier work than the round barrel job, accomplishing efficiently the chores of longer-established diamond and carborundum tools.

The two manually-operated tools can be used not only on the hardest steels but on cemented carbides in the removal of burrs and feather edges.



Miccro
Supreme
LAY-OUT AND
IDENTIFICATION DYE
12 COLORS*
For Tool, Die, Pattern or Template layout on metal . . . Quick identification of stock and parts . . . Shows up in sharp relief—dries instantly—easily removed . . . Write for circular.
*Purple shipped unless otherwise specified
MICHIGAN CHROME & CHEMICAL COMPANY
6340 E. Jefferson Ave. • Detroit 7, Mich.

AUTOMATIC WELDING

A fully automatic welding machine which joins two different kinds of steel into the turbine wheel and shaft of a jet engine for the P-80 "Shooting Star" is being used by Allison Division of General Motors Corporation, Indianapolis 6, Ind.

This operation is an important factor in the mass production of P-80 engines at Allison—the largest manufacturer of jet engines in this country.

The turbine wheel, which is the heart of a jet engine, must be able to endure temperatures up to 1500 degrees F. at its outer circumference and stresses brought about by an R. P. M. of 11,500. It is made of special cold forged heat-resisting steel alloy, 4" thick and 18" in diameter.

On the other hand, the shaft, which must be welded to the wheel, is made of No. 4140 heat treated steel alloy, and is two feet long and 3" in diameter. The weight of the finished wheel and shaft is 214 pounds.

In joining these parts together, the welder automatically goes thru three continuous cycles. The parts are positioned in the huge machine, the end of the shaft in line with a stub shaft on the wheel. As the ends are gradually made to touch, about 60,000 amperes of electricity are passed thru each part. When the temperature reaches 2600 degrees F. the wheel and shaft faces become mushy.

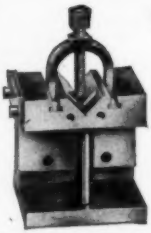
The upset occurs during the last 4 seconds of the 3 minute welding cycle, when 240,000 pounds of hydraulic pressure and over 60,000 amperes of electricity are exerted, welding the two parts together into a permanent single unit.

CUTTING OIL BASE

A honey colored, odorless, low cost base, Quaker Kut 85 can be blended with mineral oils to handle all machining jobs wherever a cutting oil is used. Blending the base with 100 Vis. or 250 Vis. oil or kerosene which are normally purchased and stocked for other purposes allows simplification of oil storage and handling without sacrifice of production efficiency.

This base can be blended in bulk storage tanks, at the oil reclamation tank, in a drum or right in the machine. No new equipment is needed.

For further information on this new transparent, odorless cutting base, write to the Quaker Chemical Products Corp., Dept. BB, Conshohocken, Pa.

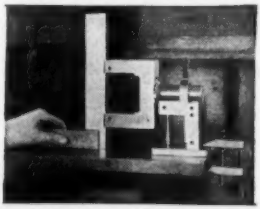


Guaranteed Accuracy!

LASSY PRECISION V-BLOCK ANGLE IRON

Holds work for Boring Grinding & Inspection

Made of finest steel and artificially aged for stability with surface hardened evenly. All surfaces are ground parallel and square within .0002. Replaces many special jigs and fixtures. Pays for itself in time saved in setting up jobs.



Send for folder B30 Other LASSY products:

Single Spindle Tapper, Sine Bar, Lathe Scale Attachment.

LASSY TOOL COMPANY
PLAINVILLE, CONN.

REDESIGNED DIE SET

An innovation in the die set industry is claimed by A. W. Grunow Co., 563 White St., Orange, N. J. This is a die set made with a new type guide post bushings. These guide post bushings of phosphor-bronze are tapered and made to turn and contract or expand as desired by loosening a lock ring and turning the adjustment ring accordingly.

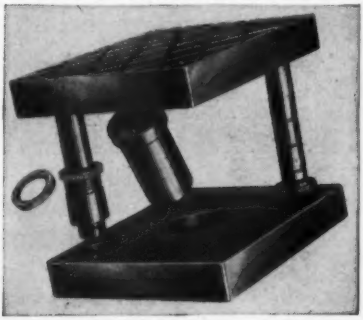
As lateral thrust wears the bushing, the lock rings are loosened and a slight turn given the bushing and the lock ring tightened.

In fitting the original position of the die into the set and for final fitting and tryout the bushings may be adjusted to any degree of tightness. When all the surfaces of the bushings have worn completely they may be replaced by a new set.

Some of the features pointed out include:

1—Speeding up of fitting of the original position of the die into the set.

2—Providing of adjustment on bushings to compensate for wear.



3—Positive post alignment at all times because the punch holder and die shoe are bored together.

4—Elimination of pry bars or jacks for separating die set.

5—Less die clearance—hence, closer tolerances.

6—The punch holder and die shoe are made of S. A. E. 1020 machinery steel with flame-cut edges, Blanchard ground flat and parallel. The steel shanks, where required, are simple and strong, without threads, pressed into punch holders.

All Die Master die sets are made to order in any size. Circular available on request to Dept. BB.

VARIABLE SPEED
TRANSMISSIONS

STANDARD'S CUB

ALWAYS THE RIGHT SPEED

Easily Adapted

PRICE $16.50 F. O. B. LOS ANGELES

Boosts Production 25-40%

DRILL PRESS BRACKET $1.50 EXTRA

★ FEATURES ★

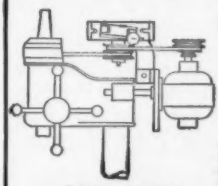
- THOUSANDS OF SPEEDS AVAILABLE
- 3.3 - 1 SPEED RANGE WITH "A" BELTS
- AUTOMATIC, POSITIVE BELT ALIGNMENT
- SUITABLE FOR OLD OR NEW EQUIPMENT
- SMOOTH-SIDED PULLEYS
- MACHINED CAST IRON CONSTRUCTION
- FULLY GUARANTEED—LOW IN COST

THOUSANDS IN USE

SPEED TABLE

Reduction Ratio*	Mach. Speed Min.	Max.
1-1	1000	3240
1-1.5	666	2160
1-2	500	1620
1-2.5	400	1300
1-3	335	1080
1-3.5	280	920
1-4	230	810

*Reduction ratio between motor pulley and driven pulley. Figures above based on 1800 RPM Motor Speed.



DRILL PRESS APPLICATION

Made in five other sizes. Information on request.

New York, New York—Carl A Miller & Co. 134 Lafayette St.
Chicago, Illinois—Chicago Pulley & Shafting Co. 17-23 N. Desplaines St.
Houston, Texas—C. P. Williams Co. 2704 W. Dallas Ave.

Standard Trans. Equipt. Co.
3407 Verdugo Rd., Los Angeles 41

CIRCLE CUTTING MACHINE HAS SELF-CONTAINED POWER UNIT

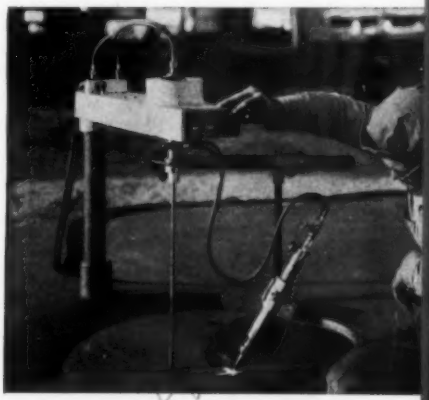
Development of a new flame circle cutting machine has been announced by the Ohmstede Machine Works, 897 N. Main St., Beaumont, Texas. Its outstanding feature is the absence of electrical connections, relying on a self-contained unit to furnish the necessary power. The weight of the machine, with torch, is only ninety pounds; it can be moved from job to job. A simple hydraulic system is provided for controlling the speed of the machine.

The machine consists of a semi-circular base which forms a support for the machine, a main column, and an overhead aluminum arm which houses the power unit and the hydraulic speed control unit. A main drive spindle projects from this aluminum arm, and this spindle carries the torch in a circular path. The torch is adjustable for different diameters, and may be adjusted from 0-40" diameter inclusive. The torch can also be set at any desired angle so as to cut and bevel the circle at the same time.

The operation of the cutter is extremely simple. The power to drive the machine lies in a large completely sealed coiled spring. The operator winds the power unit by rotating the arm of the machine 1-1/3 revolutions in an counter-clockwise direction. As the unit is being wound, a piston located in the hydraulic system automatically draws in a cylinder full of oil through a check valve; this oil keeps the abovementioned spring from unwinding through pressure on the spring. Speed is controlled by adjustment of a speed control knob, which regulates the flow of oil.

The torch is supported in a housing which adjusts the height of the torch above the work, and also allows the torch to be set at any desired angle for bevel cutting. A rack adjustment is also provided for setting the torch at the correct radius of the circle to be cut. The machine can be used with either one, two or more torches. A centering rod is provided to locate the machine over a center punch mark in the plate.

Further particulars may be obtained from Dept. BB, Ohmstede Machine Works, 897 Main St., Beaumont, Texas.



STANDARD PARTS

FOR JIGS, FIXTURES, DIES, GAGES, TOOLS AND MACHINERY

Featuring Hand Knobs, Quarter Turn Screws, Spherical Washers, "C" Washers, Jig Feet - Locating Keys

Write for Catalog No. 2

Inquiries for Tool Die and Mold Estimates Invited.

GEORGE F. BUB AND SON
11418 MADISON AVE. CLEVELAND 2, OHIO

$2000 IN PRIZES FOR PAPERS ON RESISTANCE WELDING

Announcement has been made that $2000 in cash prizes will be awarded in 1947 by the Resistance Welder Manufacturers' Association, for outstanding papers dealing with resistance welding subjects. A wide choice in subject matter is allowed in order to assure eligibility to all papers which cover worthwhile and significant information on theory and practice in this field of welding. Contest judges will be appointed by the American Welding Society, and awards will be made at the 1947 fall meeting of the Society.

One prize of $750 will be awarded for the best paper emanating from an industrial source, consulting engineer, private or government laboratory, or the like, the subject matter of which is concerned specifically with resistance **welding**. There are no restrictions on the scope of the subject matter. For example, it may be devoted to redesign of a product or products for resistance welding, improvement (from a welding and cost viewpoint) in a present design for resistance welding, resistance welding research, development of new procedures to broaden the field of application of resistance welding, etc. A prize of $500 is offered for the second best paper from an industrial source, and a prize of $250 for the third best paper.

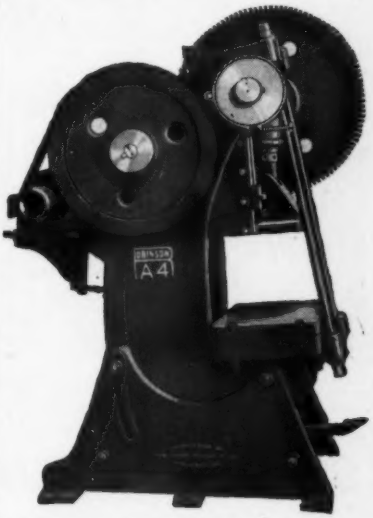
A prize of $300 will be awarded for the paper emanating from a university source—that is, either an instructor, student or research fellow, which in the opinion of the Board of Awards is the greatest original contribution to the advancement and use of resistance welding; and a prize of $200 for the second best paper from a university source.

The contest is considered as having opened August 1, 1946, and will close on Midnight, July 31, 1947.

The minimum length requirement for papers entered in this competition is 2,500 words. All papers must be typewritten, double spacing, written on one side only of blank white paper. Photographs, charts, graphs, etc., may either be attached directly to the copy or may be detached, in which case they should be clearly identified with figure numbers, captions, etc. Papers entered in the contest should be sent to American Welding Society, 33 W. 39th St., N. Y. 18, N. Y. If mailed to arrive not later than July 1, 1947, three copies should be furnished. If mailed to arrive between July 1 and July 31, 1947, six copies should be furnished.

Long Recognized

for durability strength and service



● The new improved Series A Robinson Punch Presses retain all the sturdy characteristics of their predecessors with added safety, speed, strength and ease of operation and maintenance. Available in five sizes.

Send for descriptive Bulletin No. 7.

New Albany Machine Mfg. Co.
New Albany, Indiana, U.S.A.

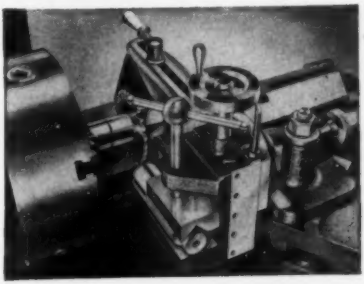
ROBINSON
Inclinable
PUNCH PRESSES

MILLING ATTACHMENT

A new development in quick change lathe tools is the milling attachment offered by Kyle-Johnson Machine Co. This new attachment fits in with the K-J Adapter Base and quick change system of lathe tooling.

Like other K-J attachments, the new milling device can be mounted on any engine lathe in a matter of seconds, enabling the operator to perform any light milling job, keyways, flats and small shafts. It can also be used as a drilling vise. The manufacturer claims that the attachment can be used on simple milling work, in lieu of setting up another machine.

The milling attachment is graduated in



thousandths and has a vertical travel of 6 inches. The jaw opening is 2⅞ inches. The attachment is flexible enough to permit angle milling and may be tilted as desired by the operator.

Complete details may be had by writing to Kyle Johnson Machine Company, Dept. BB, 1627 W. Pico Blvd., Los Angeles 15, California.

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

Write for Circular

NIELSEN TOOL & DIE COMPANY
1962 W. Eleven Mile Road, Berkley, Mich.

FOR THE SPECIAL MACHINE TOOL USER

Frequently in all types of manufacturing, the question arises, "Could the part be made cheaper on special equipment, or could the present outmoded machines be improved to meet production demand?" — and the question can best be answered by presenting the problem to experienced, special machine tool builders. The Gilman Corporation offers complete engineering and design facilities. New equipment, well-trained help, operating in a new factory, tend to keep Gilman Special Machine Tools on the preferred list to many manufacturers. From the original idea, through complete engineering to the finished machine under one roof, helps eliminate "lost motion" in your special machine tool program.

Gilman

ENGINEERING & MANUFACTURING Corporation

JANESVILLE, WIS.

Designers and Manufacturers of Special Machinery

Piercing Small Holes

by

Frederico Strasser (Santiago de Chile)

Between tool-makers and die-designers exists universally a belief that "it is not possible to punch in mild steel a hole of less diameter than the thickness of the sheet itself." The writer had the opportunity to find out that the actual, practical experience does not corroborate the above stated affirmation; he had cases where it was possible to pierce holes of lesser diameter than the thickness of the sheet; there were other occasions, where the minimal diameter of the punchable hole was greater than the thickness of the sheet. Intrigued by these divergencies, he made a theoretical analysis of the situation; the very interesting results of said investigation follows:

As known, the maximal pression which develops in a circular cutting operation with dies, can be calculated by the following formula:

$$P = 3.14\ d\ k\ s\ b \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where P = maximal cutting pression, in pounds

d = diameter of hole, in inches

K = ultimate shearing strength, in lbs/square inch

s = thickness of sheet, in inches

b = penetration of punch in the sheet (expressed in "per cent" of sheet-thickness) after which takes place the cutting.

On the other hand, the punch logically, must resist the compressive strength "P" without breaking, even without permanent deformation. Consequently it must be

$$P = K^1 \frac{3.14\ D^2}{4} \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where K^1 = ultimate compressive strength of the material, of which the punch is made

To the end that exist the possibility of punching the sheet, it must result, that

$$K^1 \frac{3.14\ d^2}{4} = 3.14\ d\ K\ s\ b \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

i. e.

$$K^1\ d = 4\ K\ s\ b \quad \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

The symbols in the formulae represent the following values:

K^1—the punch is generally made of hardened tool-steel; as a fair average, the ultimate compressive strength can be assumed as 170,000 lbs/sq. in.

K — ultimate shearing strength for mild steel is approximately 55,000 lbs/sq. in.

b — profundity of penetration after which the punch snaps out the slug, for mild or soft steel (empirical figures, taken from actual practice of first-rate experimenters; American Machinist's Handbook):

Thickness in inches		% of penetration
1/32	0.03125	87
1/16	0.0625	75
3/32	0.09375	67
1/8	0.1250	62
3/16	0.1875	56
1/4	0.2500	50
5/16	0.3125	47
3/8	0.3750	44
1/2	0.5000	37
5/8	0.6250	34
3/4	0.7500	31
1"	1.0000	25

Putting the above reported actual figures in formula (4), the same will appear, as follows:

INDUSTRIAL DIAMONDS
DIAMOND TOOLS
DIAMOND WHEELS
DIAMOND POWDER

Our No. 703 — three layers of seven diamonds each. Multiplicity of cutting points; depending on diameter of wheel, four or more diamonds will always contact the wheel, giving finer dressing and precision finish. Recommended in all straight-faced dressing and truing on wide-faced, hard silicon carbide wheels. Used most effectively on Cincinnati Centerless, Norton Cylindrical, Landis Cylindrical, and Cincinnati Cylindrical Grinders.
Requires fewer passes across the wheel. Generally used with fast dressing traverse.

"Experts agree they are the best on the market."

FOR BETTER DRESSING
Molina
INDUSTRIAL DIAMOND CO. INC.
31 W. 47th St., New York 19, N. Y.

Representatives:
Buffalo—Iroquois Carbide & Abrasive Co., 91 Grimsby Road
Pittsburgh—Commonwealth Sales Co., 200 Magee Bldg.
Chicago—J. R. Mendelsohn, 4744 Woodlawn Ave.
Los Angeles—273 S. LaPeer Drive, Beverly Hills
Toledo—Hull Industrial Supply Co., 1644 Norwood Ave.
Detroit—P. R. Dumas & Co. 1627 W. Fort St.
South Bend—Formrite Tool Co., Inc., 321 N. Michigan St.
Moline—L. R. Christiansen Co., Fifth Ave. Bldg.
Milwaukee—Redi Products Co., 211 South 2nd St.

$170{,}000\ d = 4 \times 55{,}000\ s\ b$ .....(5)

from which results

$$d = \frac{220{,}000}{170{,}000}\ s\ b \quad \text{.....(6)}$$

i. e.

$d = 1.29\ s\ b$ .....(7)

Taking now a few examples from the writer's actual experience, we will see that altho it is true that sometimes effectively happens that the minimal punchable diameter coincides with the sheet-thickness these are only exceptions. Normal and average cases give quite different values.

1) Sheet gage No. 3—Thickness 0.2391 in—
   $b = 50\%$
   $d = 1.29 \times 0.2391 \times 0.50 = 0.155$ inches,
   i. e. 35% less than the sheet-thickness
2) Sheet gage No. 6—Thickness 0.1943 in—
   $b = 56\%$
   $d = 1.29 \times 0.1943 \times 0.56 = 0.140$ inches,
   i. e. 28 % less than the sheet-thickness
3) Sheet gage No. 15— Thickness 0.0673 in. —$b = 75\%$
   $d = 1.29 \times 0.0673 \times 0.75 = 0.0652$ inches,
   i. e. practically equal to the sheet-thickness.
4) Sheet gage No. 22—Thickness 0.0299 in.
   $b = 87\%$
   $d = 1.29 \times 0.0299 \times 0.87 = 0.0336$ inches,
   i. e. 12% more than the sheet-thickness.
5) Sheet gage No. 30—Thickness 0.0120 in—
   $b = 100\%$
   $d = 1.29 \times 0.0120 \times 1.00 = 0.0155$ inches,
   i. e. 29% more than the sheet-thickness.

As it is clearly understood from the examples above reported, the minimal punchable hole-diameter is equal to the sheet-thickness only in the case of gage No. 15 (0.0673 inches). When the thickness is greater, the minimal hole-diameter can be less than the sheet-thickness; if it is less, than 0.0673 inches, the minimal diameter must be greater than the material-thickness itself. Of course, if the material has an other ultimate shearing strength (not 55,000 lbs/sq in.) or the punch has a different ultimate compressive strength coefficient (not 170,000 lbs/sq. in.) varies also the coincidence limit between minimal punchable hole-diameter and sheet-thickness.

APPOINTMENT

The Landis Tool Company announces the appointment of A. J. Jones to its Field Engineering Service department. Mr. Jones will work in New England thru Stedfast & Roulston, Inc., distributors for that territory.

Automatic Welding Of 13-Foot Grain Elevator Bin Hopper

The introduction of automatic arc welding at the Schmitt Steel Company in Portland, Oregon, resulted in outstanding savings in time and production costs in the fabrication of bin hoppers for grain and seed elevators.

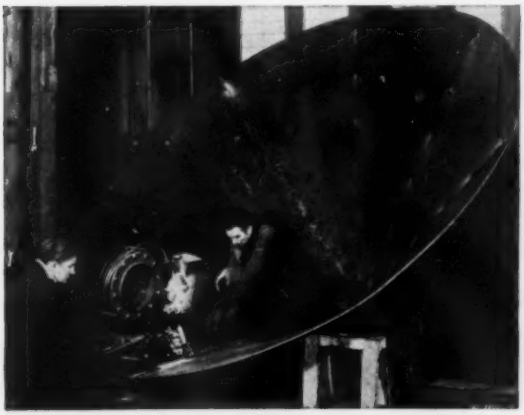
These bin hoppers, fabricated of ¼-inch steel plate are conical in shape, having a diameter of 13 feet and a depth of 5 feet. The shell of the steel-plate structure is comprised of 8 segments, and they are joined by automatic arc welding at the fulcrum which is 17¼ inches square, then lap welded down the vertical seams to the lip of the hopper.

Rigidity of the hopper is attained by the application of a steel reinforcement ring around the entire outer circumference. This ring is made of 2½-inch by ⅝-inch members that are rolled to fit. A flange ring, 5 inches by ⅝-inch, is cut to fit the outer circumference and is welded to the lip of the hopper.

Joint fit-up in the welding of the hopper segments is similar to the welding of lap joints on the plate decks of ships, and all the work in this case is positioned by means of wood blocks. The hopper, in this operation, however, is turned with the completion of each segment.

The automatic welding is by the "Lincolnweld" process, manufactured by The Lincoln Electric Company, Cleveland, Ohio

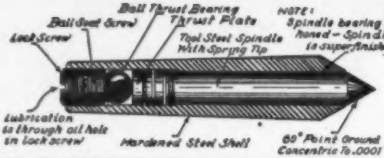
The vertical seams are welded with a 5/32-inch electrode, with the automatic welding machine set at 550 amperes and 28 volts. Arc speed down the seam is better than 42 inches per minute.



• • •

Workmen at the Schmitt Steel Company of Portland, Oregon, demonstrate their method of using the automatic "Lincolnweld" unit in the fabrication of a 13-foot grain elevator bin hopper.

★ REVOLVING TIP LATHE CENTER ★


Ball Thrust Bearing
Thrust Plate
Ball Seat Screw
Lock Screw
Tool Steel Spindle With Spring Tip
NOTE: Spindle bearing is honed—Spindle is superfinished
Lubrication is through oil hole in lock screw
Hardened Steel Shell
60° Point Ground Concentric To .0001"

$6.25

No. 2 Morse Taper Shank

No. 3—$7.75

No. 4—$9.75 Morse Taper

ASK YOUR DEALER FOR DETAILS

- Runs cool and yields under load to compensate for work expansion
- Same dimensions as standard solid centers
- No more messy lubrication of work centers
- No more damaged center holes in work
- Accurate quality construction throughout
- Saves time—saves money—saves work

ERNEST H. VANDERWALL CO.
440 Golden Gate Ave. San Francisco 2, California

USE ECONOMY — DERIVE ECONOMY

SOCKET HEAD CAP SCREWS

MILLED FROM BAR

HOLLOW SET SCREWS

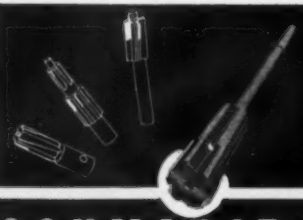
MADE OF ALLOY STEEL

ECONOMY MACHINE PROD. CO., 5207 Lawrence Ave., Chicago, Ill.

Producers of Screw Machine Products to Specifications

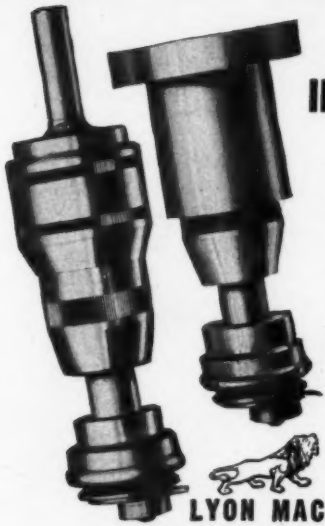
ONE, FOUR and SIX spindle automatics maximum capacity 2⅛" round. Hand Screw Machines and Universal Turret Lathes maximum capacity 3" round. Castings and Forgings machined maximum 10" diameter, 8" length, 15 pound weight. Secondary operation equipment for milling, drilling, tapping and assembling. Fabricators of aluminum, brass, steel and their alloys.

SCREW MACHINE SPECIALTY CO.
5600 Butler St., Pittsburgh 1, Pa.



USE SCHMARJE
CARBIDE-TIPPED
HIGH PRODUCTION TOOLS

SCHMARJE TOOL AND ENGINEERING CO.
MUSCATINE, IOWA

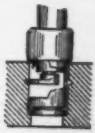


The Lyon
INTERNAL GROOVING TOOL

Its versatility saves costly preparation time — provides precision grooving of single or multiple grooves at a production rate — plus economy of set-up time — and low initial cost. The LYON has been designed for making internal grooves to tolerances of .001" using any drill press, turret lathe, radial drill or automatic equipment.

By changing only bushings and cutters within the tool model range, you have at your command a wide variety of bore sizes and shapes. A simple adjustment regulates location and depth of groove. Work cannot be scratched or marred because the head of the tool does not turn when the cutter operates.

Our Engineering Department will welcome the opportunity of discussing any grooving problem without obligation.



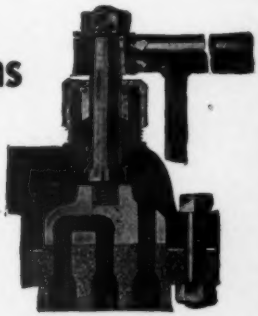
GROOVE LOCATED FROM BOTTOM OF HOLE

SINGLE GROOVE LOCATED FROM TOP OF HOLE

LYON MACHINE CO., WORCESTER 3, MASS.

SOLVE
Valve Corrosion Problems
WITH
NICHOLSON
CYLINDER CONTROL **VALVES**

CUSTOM CONSTRUCTION enables you to meet the problems presented by specific mediums and pressures. Choice of 6 different metal combinations. Nicholson control valves also feature specially treated, extra hard seats that don't cut out, affording maximum "slow wear"; trouble-free simplicity. Pressures to 500 lbs.



2-, 3-, 4-way, multi-port, metering, distributing, and special types; lever, foot, solenoid and motor types; for air, steam, oil, gas, tar, water.

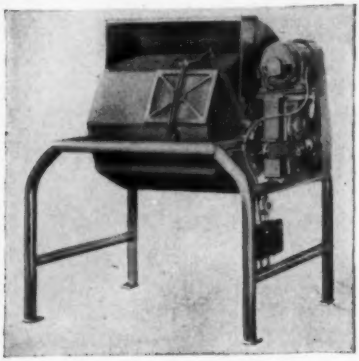
W. H. NICHOLSON & CO.
117 Oregon St. Wilkes-Barre, Pa.

Catalog 546

SOSSNER
● GREATER ACCURACY OF THREAD
● MORE PRODUCTION PER ROLL
● FINER PART FINISH
SOSSNER N.Y.C.
THREAD ROLLS . . .
with Sossner's
amazing long-life
Mirror-Finish
These new Sossner Thread rolls are ground from the solid high speed stock, specially heat treated for hardness, then specially processed to achieve their unique Mirror-Finish. Send us your specifications for estimate. FAST DELIVERIES ASSURED.
Taps • Plastic Molds • Hobs • Steel Stamps
SOSSNER
161 GRAND STREET, NEW YORK 13
27 BROADWAY, LYNBROOK, N. Y.

DEBURRING, FINISHING BARRELS

Almco Incorporated announces a line of 11 octagonal deburring and finishing barrels of 30″ diameter and 32″ to 60″ length, with 9 standard compartment sizes from 12″ to 60″ length. Design features include 4-speed drive, quick-clamp doors and



welded steel construction thruout.

These barrels are furnished either plain (unlined) or with full neoprene lining. They are motor-driven at 10, 15, 20 or 30 r.p.m. (approx.) thru a speed reducer and 4-step V-belt pulleys, a lever-operated belt release mechanism permitting quick selection of the desired speed. To facilitate positioning of the barrel for loading and unloading, rotation in both directions is controlled by a start-stop lever which applies a hydraulic brake when in the "stop" position.

The compartment doors are light in weight (21¼ lbs. each for 16″ compartment), and are opened and closed by a quick-acting toggle clamp. The clamping lever permits the door to be cracked open for draining before unloading. All doors have a water-tight sponge rubber seal, with a take-up adjustment to compensate for eventual compression of the seal. For rapid and complete unloading, door openings come within ¾″ of the compartment end walls.

All Almco barrels are mounted in a welded tubular steel frame as illustrated, giving free access to the doors for loading. To permit unloading directly into a work pan or onto a screen, there is 28″ clearance beneath the barrel. The barrel itself has an approved guard rail and pull-down safety hood, and the driving

mechanism is fully enclosed to meet all safety requirements.

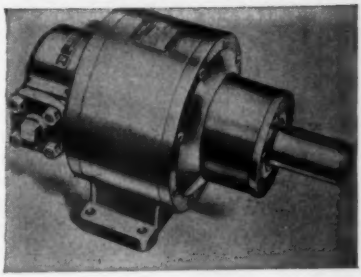
A descriptive bulletin is available on request from Almco Incorporated, Dept. BB, 231 E. Clark St., Albert Lea, Minn.

SMALL SIZE PUMP

A hydraulic pump developing 5,000 lbs. per square inch, yet small enough and light enough for a boy to handle—that's the description which the Superdraulic Corporation of Dearborn, Michigan, gives to its new "Superdraulic Junior" hydraulic pump.

As the name implies, the Superdraulic Junior is practically a duplicate of the Superdraulic 40 hp Constant Delivery Pump on a reduced scale. It is only 6" in diameter, 11" long, and weighs approximately thirty-five pounds. It delivers 5,000 pounds per square inch in continuous duty service. The single bank of plungers delivers three gallons per minute at 1,800 rpm, and two gallons per minute at 1,200 rpm.

The company predicts that the new pump, which is only slightly more than half the size of the Senior model, would meet with wide acceptance as a means of hydraulic power application to machinery



where space is at a premium and yet where the flexibility and perfect control afforded by hydraulic power is desirable. The new pump has a wide range of applications — particularly adaptable as a holding pump to presses, and plastics injection molding machines. The Junior pump may also be used as a powerful reversible hydraulic motor.

Illustrated descriptive literature about the Superdraulic Junior Pump may be had by addressing Superdraulic Corp., Dept. BB, Miller at Ford Road, Dearborn, Michigan.

NEW KNEE TYPE MILLING MACHINE

Designed for small shops, instrument laboratories and individual users. Built strong and sturdy for work of the finest quality and accuracy — at low cost.

All rotating parts move in anti-friction bearings. Other features include heavy construction, adjustable dials, all bearings of sealed construction and lubricated for life of machine, etc.

CAPACITY: Longitudinal feed 6", transverse feed 1½", vertical feed 4".

Write for Complete Details Today.

Manufacturers of Precision Knee Type Milling Machines and Production Attachments

CHILDS & CO.

510 Sandusky Street
CONNEAUT, OHIO

COMET
INTERNAL THREADING AND BORING TOOLS
For holes from ¼" upwards, 15 different sizes. The accurate thread angle is maintained through each sharpening until tool is entirely worn down. Small head-long cutting surface for regrinding.
COMET TOOL CO.
738 B'way., New York 3, N. Y.
Write for Complete Data.

TESTING MACHINE

To fill the need for a bench-type fatigue testing machine with the "constant-force" loading feature, the Baldwin Locomotive Works offers the Sonntag Model

SF-2 machine. The new machine affords flexure fatigue tests on sheet stock of any material—metal, plastic, wood—and requires no attention during the test. The design eliminates electronic equipment, complex linkage or special device to maintain a constant force while the specimen is under test.

Baldwin's latest addition to its line of fatigue and simulated service testing machines uses a revolving eccentric mass as a means of loading the specimen, avoiding cams or eccentric connecting rods. With this constant force machine, the load automatically remains constant regardless of the changes in the amount of deflection of the specimen. A predetermined load is alternately applied to the specimen, and the resulting deflection is incidental.

Because of its small size, 15" x 12" x32", the SF-2 can be placed in a cabinet during a test so that temperature and humidity can be controlled. The machine weighs 115 pounds, has an alternating force capacity of 20 pounds and a speed of 1800 cycles per minute with a total travel of the loading yoke of one inch per cycle.

Bulletin 256, describing the machine in detail, can be obtained from The Baldwin Locomotive Works, Dept. BB, Philadelphia 42, Pennsylvania.

CAM FEED UNITS

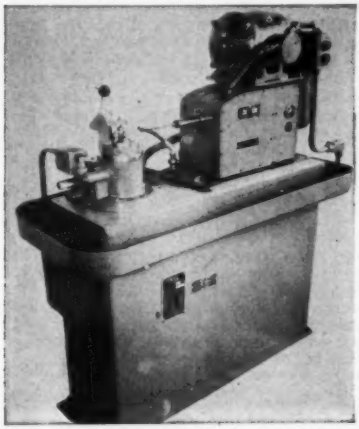
A recent development of the Avey Drilling Machine Company, Dept. BB, Cincinnati, Ohio, are the No. 1 and No. 2 Cam Feed Units, developed for drilling, reaming, counter-boring, and tapping.

ISOMETRIC SKETCHES ARE EASY TO MAKE AND READ!
One trial will make you another steady user of WADE'S ISOMETRIC blue lined paper. Shows all surfaces and interior to scale. Makes clear blueprints. Saves time daily in hundreds of plants. Write for Circular.
1422 E. 109th St. Dept. H, Cleveland, Ohio
Wade Instrument Co.

GEM VISES
J. E. MARTIN MACHINE WORKS
SPRINGFIELD, OHIO

This is a self-contained unit with electric controls for operating and synchronizing multiple unit set-ups.

These Avey Cam Feed Units have a



great many possibilities for application to special machines, and completely eliminate manual operation of spindle. This materially assists in cutting down operator fatigue, reduction of man hours and increase in production resulting in higher production at a lower labor cost. Here illustrated is an application in method No. 1, with the standard Avey Cam Feed Unit tied into an automatic indexing fixture—job similar to drilling smoke holes in pistons. The capacity of the units: No. 1 a ½" capacity in cast iron, No. 2 a ⅞" capacity in cast iron. For complete information, Engineering Bulletin, No. 645 is available free upon request.

ELECTRONIC WELDING TIMER

Photoswitch Electronic Welding Timer Type 30CR3 is designed for interval timing of welding operations over a range of 3 to 120 cycles. It is recommended for all general-purpose spot welders and fulfills the specifications of NEMA Class 1A Timers. It is applicable to manual, air or motor operated welding equipment requiring either beat or non-beat operation.

The timer incorporates many features of particular importance to the welding field. The timing adjustment can be set for any interval from 3 to 120 cycles. It

do
YOUR DRILLING
with the

Speed-Right

The *right* drill speed is instantly available with Electro-Mechano finger-tip speed control. The *right* speed is maintained without further adjustment regardless of the number of pieces or type material drilled.

8" BENCH DRILL PRESS

For holes .004" to 5/32"; .0001" chuck run-out; 1000 to 10,000 or 2500 to 15,000 RPM Speed Range

Electro-Mechano drill heads are complete units that operate in any position. They are available for multi-drill production set-ups.

For FAST—SENSITIVE—ACCURATE—and dependable small hole drilling, use the Electro-Mechano High Speed Precision Drill Press and the *Right* drilling speed.

BULLETIN 200

The ELECTRO-MECHANO CO.

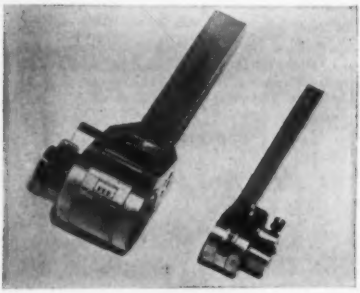
261 E. Erie St. Milwaukee 2, Wis.

is calibrated at these two settings, and its accuracy thruout the range is said to be within 2%. The timing adjustment is located on the panel inside the housing, thus providing a tamper-proof setting. The timer may be used with either a 115 or 230 volt a-c supply. By simple selection of terminals on the terminal panel, the timer will provide beat or nonbeat timing (initiation of timing cycle from momentary contact or sustained contact). The terminal panel is provided with a dead front so that there is no possibility of the operator touching the terminals when setting the timing interval.

Combinations of Timer Type 30CR3 are used when it is desired to control also other portions of the welding cycle, such as the squeeze, heat, cool, on and off periods.

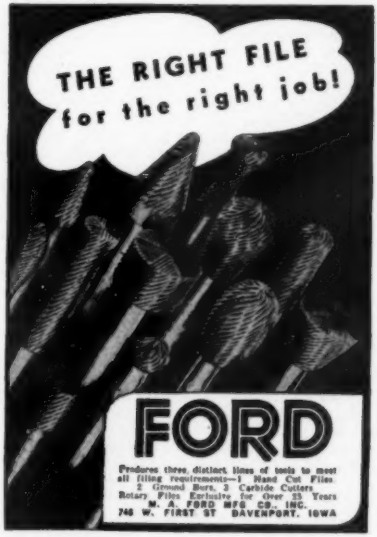
AUTOMATIC ROLL MARKER

Designed for use in lathes, shapers, automatic screw machines, etc., a new automatic roll marker for imprinting letters, numbers, calibration lines, serrations, etc., on finish-machined metal parts is available from New Method Steel Stamps, Inc., Dept. BB, 147 Jos. Campau, Detroit 7, Michigan. One of the features of this roll marker is the ability to use it interchangeably for right or left handed operation, as desired. Other new features include use of pre-lubricated sealed-in ball bearings for the roller die shaft.



With the "changeover" arrangement, the adjustable stop, stop-dog, and the fully enclosed automatic spring return can be shifted as an assembly from one side of the marker to the other to suit position in relation to spindle rotation. The marker is also equipped with a device for adjusting the tension of the automatic spring return for the roll.

The new markers are available with rolls of either solid or interchangeable type. The tools are standardized as to general design, shanks being designed for mounting in conventional holders, but are custom made to meet specific dimensional requirements. Altho designed primarily for use on automatic screw machines where large quantities of parts must receive identical markings, this new automatic roll marker can also be adapted for use on lathes, shapers, and other similar machine tools.


THE RIGHT FILE
for the right job!
FORD
Produces three distinct lines of tools to meet all filing requirements—1 Hand Cut Files 2 Ground Burs, 3 Carbide Cutters
Rotary Files Exclusive for Over 25 Years
M. A. FORD MFG. CO., INC.
746 W. FIRST ST DAVENPORT, IOWA

CUT ANY SHAPE BETTER with BEVERLY Throatless SHEARS

The No. B-3 BEVERLY Bench Type Shear with Ball Bearing Hold Down handles 3/16" or No. 10 gauge stainless steel. This sturdy shear weighs 58 lbs. and is equipped with H. C. H. C. Blades for heavy duty service.

Let us send Bulletins giving full details on the BEVERLY LINE —

THE BEVERLY SHEAR MFG. CO., 3005 W. 110th Pl., Chicago 43, Ill.

For STATISTICAL QUALITY CONTROL

COMTORPLUG PRECISION INTERNAL COMPARATOR

Indicating • Precise • Portable

1. Indicates exact size of hole by a direct, fixed (not passing) reading.
2. Its Automatic 2-point gaging shows, to a fraction of .001", the diameter of ANY PART of a hole, detecting front or back taper, out of round, etc.
3. As portable as a micrometer, it permits precision gaging AT THE MACHINE, where Quality Control actually must occur.
4. Plugs are interchangeable for holes from ⅛" to 8" dia. and larger. Comparator Principle gives long plug life.

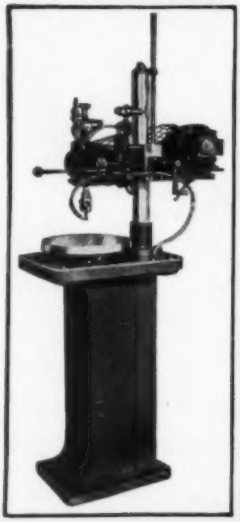
Request Illustrated 8-Page Bulletin No. 33

COMTOR CO. "COMTORGAGE". Other Comtor Products: Precision External Comparator: Bulletin 38 COMTOR SURFACE SMOOTHNESS COMPARATOR: Bulletin 32

62 RUMFORD AVENUE WALTHAM, MASS.

Precision . . . .

TAPPING



Leads changed in 90 seconds

M & L

PRECISION TAPPER

This is a fast rugged production tool capable of sustained accuracy. Flexible and adaptable, it cuts clean screw threads, handling up to ¾" in non-ferrous metal and 0 to ½" in SAE steel. Class 3 and Class 4 gage fits and high production schedule are accomplished in normal operation even with unskilled help.

Tapping speeds are 95 to 350 rpm with reverse speed twice that of forward speed. Taps are guided by precision ground lead screws which are easily and quickly changed. Bulletin 143 gives full details.

Dealers' inquiries are invited

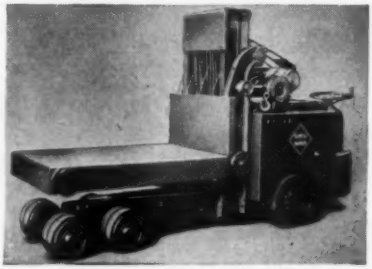
LECKINGER

MACHINE AND EXPERIMENTAL CO.

716 N. Highland Ave., Los Angeles, Calif.

25-TON DIE-HANDLING POWER TRUCK

What is claimed to be one of the most powerful industrial trucks ever built for handling forging and metals-stamping



dies has been developed by the Elwell-Parker Electric Co., Dept. BB, Cleveland, and now is in production for 1947. It is rated at 25 net tons capacity.

Removing and replacing large blocks

of metal has been a dangerous, time-consuming and costly job in forging and metals-stamping plants. Suspension of dies from chains and cables in moving them thru the shop has presented additional hazards to men and machines.

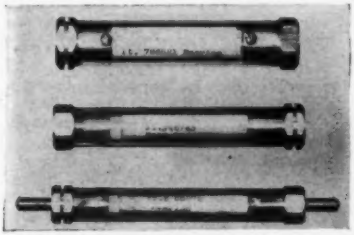
The mobility of the power truck also is a factor in transporting a die between press, machine shop or storage. The die always is on firm foundation, never suspended overhead or moved on rollers. It can be transported from one department

or building to another. Illustration at right shows one of these trucks handling automotive dies in outside storage.

Platform of the 25-ton truck is 53" wide, 72" long. Dies which it is built to handle project over the edges of the platform, making it a simple operation for the driver of the truck to lower it on to blocks or pick it up from them, in storage. Die handlers are also available in 2, 3, 5, 10 and 15-ton capacities.

VIS-U-TROL GAUGE HANDLE

The Vis-U-Trol transparent gauge handle was primarily developed to eliminate the need of supplying special stamped handles for each size gauge. It was further developed to enable a history of the gauge to be maintained by means of a typewritten card, which would remain with gauge thruout its life. A further advantage is that a product control or an area control for the gauge can readily be established by means of various colored cards to indicate the latitude of the control.



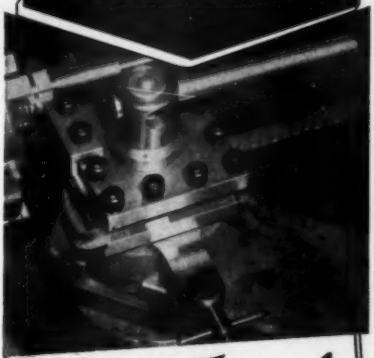
The Vis-U-Trol gauge handle consists of a lucite tube into the ends of which are inserted steel gauge ends. These gauge ends are held in place by means of two shallow-type filister head screws that come flush with the outside of the lucite tube. One gauge end has a groove cut into it while the other remains solid so that the "Go" end can be visibly distinguished from the "No Go" end.

After the data has been typewritten on the proper size card, it is placed into the lucite tube and the screws inserted. The screw heads are then sealed by means of sealing wax to prevent tampering with the card record.

The gauge ends are made hexagon to prevent the assembled gauge from rolling if it is placed on a flat surface.

For further information write to Industrial Development Associates Inc., Dept. BB 233 Spruce St., Bloomfield, N. J.

4 OPERATIONS
on your
ENGINE LATHE
WITH ONLY
1 TOOL SET-UP



Colwell Turrets
from $36 to $60.50

With a Colwell 4 Tool Post Turret on your lathe, you can do turning, necking, threading, cutting-off — or any combination of successive operations up to 4, with just one tool set-up. No time lost changing tools and our positive indexing assures working to close tolerances. Sizes to fit most lathes. Write for catalog.

S. G. COLWELL
25 Congress Ave.
Providence, R. I.

Easy RECIPROCATING ELECTRIC SANDER

FOR FINISHING FILLED COATS ON MACHINE BASES

. . . etc.

No laps, swirls, stutter marks or gouges when you use EASY with "straight-line sanding action".

Requires no skill. Finishes CURVED or flat, WET or dry surfaces 3 to 4 times as fast as by hand. A light weight, rugged, durable tool.

Write for literature or see your jobber.

DETROIT SURFACING MACHINE CO.

7432 W. Davison Ave., Detroit 4, Mich.

FLUORESCENT STRIP LIGHTS

Electricraft Corp., Dept. BB, 42 Clifton Street, Newark 5, N. J., announces a new fluorescent channel light for commercial and industrial use.

The standard channel lights can be used individually in gang fashion or butted together for continuous strip lighting. They are intended to be readily adapted for use in offices, plants, showrooms, stores, display windows and for trough lighting where special effects are desired.

Available in three models: 20 watt single lamps; 40 watt single lamps; or 40 watt for two lamps. Complete data will be supplied promptly on request to the manufacturer.

NEW LINE OF SINGLE-CRANK TOGGLE PRESSES

A new line of single-crank toggle presses in eight sizes ranging from 4¼ to 7" shaft diameter and from 8½ to 24½" stroke length, is announced by the E. W.

Bliss Co., Dept. BB, 450 Amsterdam St., Detroit. They are used for deep drawing operations on steel, brass, copper, aluminum and other metals.

The new designs feature steel-weldment construction, resulting in weight-savings and reduced floor space requirements. Operating speeds, stroke lengths and die-space dimensions remain the same as

those for previous models, thereby permitting interchange of tools.

Redesign of the toggle driving mechanism provides a cross head with long guides at the position where it is most needed. Steel rockshafts, yokes and links are provided in the toggle-driven blankholder mechanism.

The clutch is of the new Bliss single-disc friction type, with one-station electric pushbutton control. An airbrake for stopping the flywheel is included.

All of the new machines have steel gearing, fully guarded to approximately 8 feet above floor level. Single helical or herringbone gears can be furnished as an extra feature.

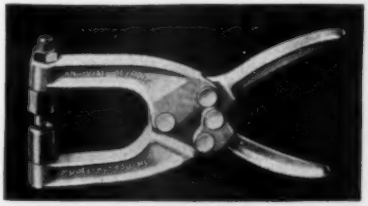
A manifold lubrication system, with metal tubing leading to each bearing, is standard equipment, replaceable by semi-automatic or automatic lubricators of the user's choice.

A wide range of Bliss-Marquette equipment is adaptable to the new machines.

HOLE LOCATOR ANNOUNCED

By means of a new hole locator, just announced by Knu-Vise, Inc., several sheets of metal can be quickly aligned to position them for riveting, spot welding or drilling.

The new device looks like ordinary pliers and is reported to operate as simply. This model, catalogued as KL-450-HL, has a toggle-action which automatically locks upon the work held, leaving operator's



hands free to perform other work. An easy motion separates the handles to release the pliers.

The pressure spindle can be adjusted to admit work up to 1¼" thick with locating pins available in all popular diameters. The Hole Locator is 8" long and 3" wide and is capable of holding a maximum of 500 pounds. It weighs 22 ounces.

An actual sized template will be supplied on request to Knu-Vise, Inc., 2200 Eighth St., Detroit 16, Mich.

AID IN CARRYING TOTE PANS

A new departmental truck, called "Easy - Tote", has been announced by Easy-Tote Products, Inc., Dept. BB, Arcade, N. Y.

This new truck, in the handling of tote pans is designed to reduce manual effort. There is no heavy lifting in bent-over positions or dropping of heavily-laden tote pans. This is accomplished by utilizing a combination of features including a crank, hook, rigid handle and tilting, low base plate. Any worker can load, roll and unload these trucks quickly and easily.

Equally invaluable is "Easy-Tote" as a general all purpose truck. The flat, low base plate accommodates containers or "what-not" (other than tote pans).

The loads are carried equally by three wheels. Uneven floors and small obstacles do not hinder the rolling of these loaded trucks. The balance between the three separate wheels practically eliminates all spillage.

This truck not only will load and unload in a minimum of floor space, but also under work benches and tables. The base plate is a 3/16" steel plate 16" x 22" that is adequate to accommodate tote pans of all standard sizes. This base plate is only two inches from the floor.

The pair of 3" diameter roller bearing wheels with a thru heavy axle welded to the base plate carries a 600 pound load with a generous safety factor. The ball bearing caster with roller bearing wheel located at the rear of the base plate permits these trucks to turn in their own length.

Small fenders are located over each of the side wheels to guide the boxes as they are loaded, prevent movement of load sideways, and eliminate wheel interference when the truck is moving.

For complete information concerning these new "Easy - Tote" departmental trucks for tote pans and "what not" write to Easy-Tote Products, Inc., Dept. BB, Arcade, New York.

STANDARD D-4 Abrasive Band Grinder

Famous for Stamina

This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36¼" band. The ideal portable unit.

OTHER STYLES AND SIZES IN NEW MANUAL ON FINISHING—WRITE TODAY

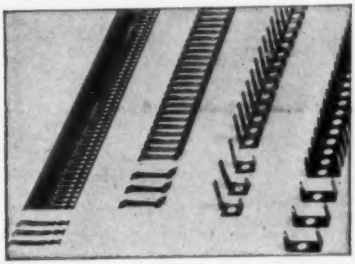
WALLS SALES CORP.
306 E. 38th St., New York 16, N. Y.

SPRINGS IN CONTINUOUS LENGTHS

Significant savings in assembly and handling time, as well as lower piece cost for springs and small stampings, are said to be made possible by a continuous-strip production method developed by I-S.

Individual small springs are fabricated of beryllium copper in continuous, easy-to-handle lengths with sections between parts partially sheared thru. Attachment between parts is sufficiently strong to

keep lengths intact during inspection, plating, handling and shipment. Individual pieces, however, snap off easily when ready for assembly. Lengths may be inserted in dispenser at assembly benches, allowing the operator to break



off individual pieces as needed, making a one-handed operation.

This method makes the advantages of fixture heat-treated beryllium copper available at a low unit cost. For production line items running in quantity, many parts can now be supplied with tolerances held accurately enough to completely eliminate hand adjustment and truing up after assembly. This new method offers further cost reduction in riveting operations, making possible an automatically fed operation.

For further information write Instrument Specialties Company, Inc., Little Falls, N. J.

SALES ORGANIZATION

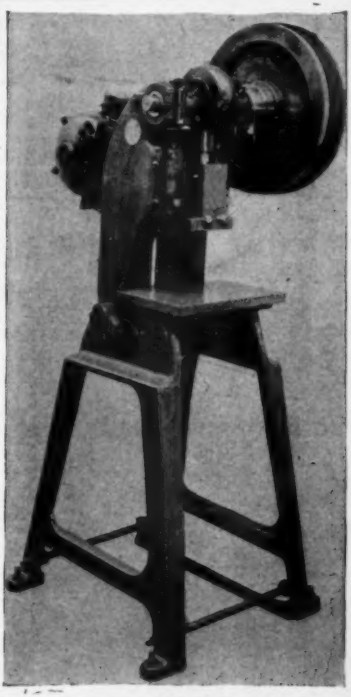
Nat J. Weiss, Sales Manager for the past five years of the Larkin Lectro Products Corp. has formed the Nat. J. Weiss Sales Associates which will handle all sales domestic and foreign, of the entire output of the Larkin Company. These include not only a complete line of Spot, Projection, Butt and special resistance welding units, but also a well rounded line of a-c Arc Welders featuring the Larkin Stepless Microamp Control.

Mr. H. R. E. Austin formerly Sales Manager with Rex Welder & Engineering Co., and District Manager with the National Cylinder Gas Co. will be associated with the new organization.

Nat J. Weiss Sales Associates will be located at the plant of the Larkin Lectro Products Corp., 160 W. 146th St. New York.

15 TON HUB PRESS

Immediate Delivery
Equipped with Motors



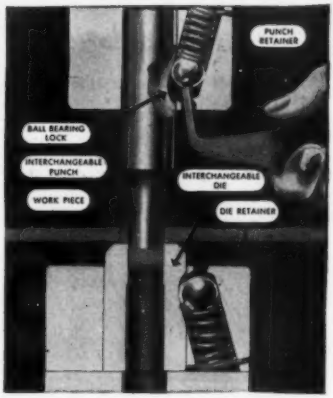
Other Capacities available are 4½, 6, and 27 ton sizes.
New 27 ton press just out.

• • •

HUB POWER PRESS

W. F. BREWER MACHINE CO.
75 Laurel St., Hartford 6, Conn.

PUNCHES and DIES are *Quickly* INTERCHANGEABLE

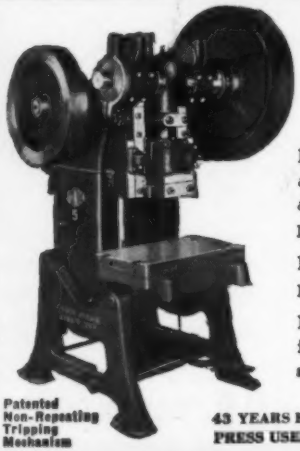


Allied's R-B Interchangeable Punches and Dies are quickly installed for trouble-free production in the metal-working and plastics industries. They are available from stock in *standard* round, oblong and square shapes of almost any required size. Specials of any size, shape or material are promptly furnished to your specifications — and delivery dates are *dependable*.

Write today for large illustrated R-B Catalog

ALLIED PRODUCTS CORPORATION

Department 20 • 4644 Lawton Ave. • Detroit 8, Michigan



Patented Non-Repeating Tripping Mechanism

UNLIMITED PEAK PRODUCTION

With Modern JOHNSON POWER PRESSES

Much larger die space than average presses. Engineered and designed for unlimited peak production.

Reinforced construction at points of greatest wear.

If you want the best, send for illustrated catalog describing complete line TODAY.

43 YEARS ENGINEERING EXPERIENCE BUILT INTO EVERY JOHNSON PRESS USED BY LEADING MFR'S. THROUGHOUT THE WORLD.

JOHNSON MACHINE AND PRESS CORP., ELKHART, INDIANA

Let's Talk Shop

LIGHTWEIGHT PALLET LIFT TRUCK

Completely new design, construction and operational features are announced by Lyon-Raymond Corporation in regard

to their new 2000 lb. capacity hand pallet truck.

Total enclosure of working parts serves to protect them. The use of high strength alloy sheet steel formed into box sections for the frame, and aluminum alloy for wheels and other non-structural parts insures a minimum of weight.

Elevation is accomplished thru a hydraulic foot pump, especially designed for the truck. Length of stroke is optional, depending on the stature of the operator. Lowering results from pushing the foot pedal forward. The pump is equipped with a relief valve to prevent overloading and possible damage.

Full details and price information are available from the manufacturer, Lyon-Raymond Corp., 3208 Madison St., Greene, N. Y. Simply write for copy of Bulletin No. 221.

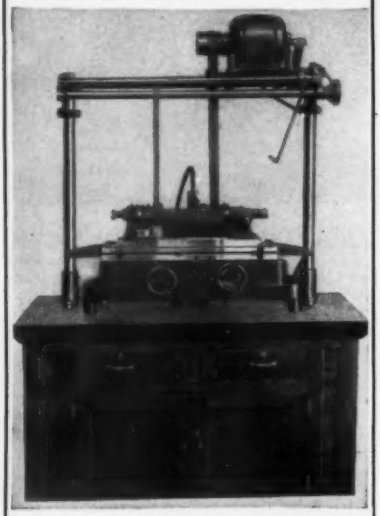
STRIPPABLE PLASTIC COMPOUND

Spray-Peel, the strippable plastic compound developed by Eronel Industries, Dept. BB, 5714 W. Pico Blvd., Los Angeles, is reported to solve corrosive and abrasive problems that beset the metal industry.

Applied easily by brush or spray, Spray-Peel is said to dry quickly to a rubbery film, have sufficient adhesion to insure complete sealing and have adequate tensile strength to permit easy stripping.

The new strippable compound is stated to be non-toxic and to have marked resistance to moisture, abrasion, salt water, aromatic spirits and oils, alkalies and acids, and all atmospheric temperatures.

Spray-Peel strippable coatings were developed for military use during the war for the protection of aircraft which were to be subjected to overseas shipment or extended storage.



"At Recent Power Show, N. Y. C., two hundred sample gages were ground. Over one hundred tested under One Micro Inch Surface Finish with balance averaging one and one-quarter Micro Inch Surface Finish."

Gages were High Speed Steel using a 38220 K 9 BE Wheel.

Write for catalog on Super-Precision Grinders.

CRYSTAL LAKE GRINDERS
CRYSTAL LAKE, ILLINOIS
Since 1910

MICRONIC FILTERS

Greer Hydraulics, Inc., Dept. BB, 454 Eighteenth St., Brooklyn 15, N. Y., is distributing a 4-page, 2-color pamphlet describing its full line of micronic filters.

Beginning with a full page illustration of a 30 gpm filter, the brochure goes on to describe in detail the importance of oil cleanliness and the hazards of contaminated oil. An exploded view with a complete parts breakdown is also included giving full details on the construction and materials used.

The last page gives full engineering data, performance charts, and actual test reports.

For a free copy of this booklet, write today on your company letterhead.

COMPARATOR ANNOUNCED

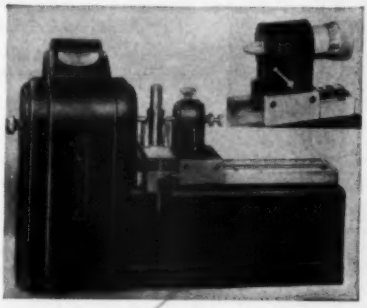
A new horizontal external comparator for inspection and gage laboratory use is announced by the Sheffield Corporation of Dayton, Ohio. It has a range of 3½" in height and zero to 10½" in length, to permit quick, accurate measurement of rectangular, threaded or cylindrical parts, tapered or straight, within its range to millionths of an inch, the manufacturers report.

Many exclusive features are pointed

out. They include an adjustable pressure attachment, elevating table, Sheffield Electrigage head available in a wide range of amplifications, and the choice of a standard or micrometer tailstock with a large easily read calibrated barrel. All are combined to remove or prevent the inaccuracies liable to occur thru the human element.

Flexibility allows two methods of set-up and operation. Use of the micrometer tailstock on a range of applications below one inch permits readings of .0001" from the calibrated barrel without the use of gage blocks or masters, while if the full accuracy of the instrument is desired, the tailstock may be set at zero, gage blocks used for set-up, and readings in millionths obtained from the Sheffield Electrigage head. This indicating unit may be obtained in amplifications of 100-1, 2500-1 or 5000-1.

The table is adjustable vertically from zero (center line of gaging anvils) to 3½", and is fastened by means of a locking screw. It may be positioned horizontally within a range of 10½", and if necessary can be quickly and easily removed. Conveniently located to the left of the indicating unit is the adjustable pressure attachment knob, which is calibrated from 2 oz. to 40 oz. pressure. This covers the range of 1 lb. to 2½ lbs. pressure recommended by the National Bureau of Standards for measuring threads by the three wire method.



Write to Dept. BB for further information.

OF HIGH PRECISION

SCREW MACHINE PARTS

Metal screws, bolts, nuts, cylindrical and conical pins, washers and screw machine parts of every kind and size — in practically all metals. Every part of exact accuracy, backed by years of manufacturing in the usual Swiss tradition for precision.

We can supply to your specifications — please send sample or blue print and state quantities required.

PARK SALES COMPANY

"Importers of Swiss Precision Screw Machine Parts"

417 Canal Street New York, N. Y.

RESISTANCE WELDING MANUAL —REVISED EDITION

Published by Resistance Welder Manufacturers' Association, 505 Arch Street, Philadelphia 6, Pennsylvania. 552 pages. 6 x 9 inches, cloth bound. $3.00 Post Paid.

Revisions in this manual of the resistance welding processes have practically doubled the size of the volume compared with the first edition, making the present edition a much more complete treatise. Twenty entirely new chapters have been added. The tables of recommended procedures have been revised to bring them up-to-date with respect to present-day practice. Numerous additions, based upon research and experimental work conducted during the war production period, furnish operating data on materials not covered in previous editions.

In the section dealing with resistance welding procedures, each group of metals is treated in a separate chapter. The general plan of each of these chapters is a discussion of the resistance welding properties of the subject material, followed by explanations of the relative importance of the various operating variables and schedules of recommended welding conditions.

Mechanical and electrical characteristics of both conventional a-c and stored energy systems are treated in detail, with large additions to the discussions of electrical controls and power supply.

A new section contains chapters on quality control, standard tests, and instrumentation. In addition to outlining test specimen requirements for the various standard tests, there is a supplementary discussion which points out the common fields of application for the different methods of testing. Among other important contributions to this edition is a chapter on recommended maintenance practices for resistance welding machines, a glossary of the latest approved definitions used in the industry, and a collection of useful tables.

In the preface of this volume, it is stated that the results of many important research studies have been briefed and abstracted for inspection in proper locations, and that many leading authorities in the welding industry have made valuable contributions of up-to-date information on practices and procedures. In view of the broad scope of the subject matter, this is a resistance welding book which will meet the information requirements of engineers, production executives and machine operators.

"STAR DUST"
LABORATORY GRADED
PURE DIAMOND POWDERS

STAR DUST speeds up production enormously and produces finishes and superfinishes down to less than .0000004 of an inch.

Precision LAPPING POWDERS for PRECISION work

For GAUGES, TOOLS, DIES, etc., with tremendous TIME SAVING. These factors make STAR DUST indispensable in lapping and superfinishing on HARDSTEELS, TUNGSTEN CARBIDE, CHROME.

- Absolute control of particle sizes
- Complete absence of out-size particles
- STAR DUST sizes as fine as .0001"
- Complete range of grit sizes

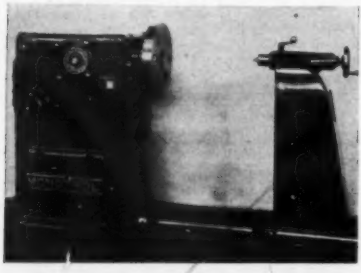
There is a STAR DUST Field Serviceman in your territory.

ACE ABRASIVE LABORATORIES
ONE SPRUCE STREET
NEW YORK 7, N. Y.

HEAVY COIL WINDING EQUIPMENT

Now available to manufacturers of heavy electrical equipment is this heavy duty coil winding machine being manufactured by The Sidney Machine Tool Company, Sidney, Ohio along with their regular line of engine lathes and tool room lathes.

The No. 3 Monotrol Winding Machine as illustrated is a self-contained transmission built in an oil-tight housing. Because of its capacity it is capable of handling many different winding operations. It has a maximum swing of 66" for large diameter coils and when furnished with tail base an unlimited capacity between centers can be provided.



The head consists of three main shafts. The drive shaft is mounted at right angles to and below the intermediate shaft and main spindle. On the drive shaft are mounted two oil type and multiple disc clutches, one of which serves as a driving clutch, the other as a brake. Mounted between these clutches is an hour-glass driving worm and worm gear which transmits the power to the intermediate shaft and through a series of herringbone gears to the main spindle.

The eight spindle speeds are in geometric progression and range from 4 to 124 rpm. All gears run constantly in mesh, the speed changes being made by double and internal tooth clutches sliding on spline shafts. These clutches function thru a one-lever principle known as the Monotrol. This feature permits the selection of any speed by the rotation of the lever conveniently located at the front of the machine.

All shafts including the main spindle are mounted on Timken tapered roller bearings and all loose running gears are bronze bushed. The entire machine is automatically lubricated from a central-

DEPENDABLE MEASURING & CHECKING EQUIPMENT

SURFACE PLATES
Over 50 sizes, ranging from 7 x 7½ to 96 x 192.

SLOTTED ANGLES
in 19 sizes, ranging from 4 x 9 x 5 and up.

BOX PARALLELS
in 15 sizes, ranging from 3 x 4 x 12 and up.

UNIVERSAL ANGLES
in 10 sizes, ranging from 4 x 3¾ x 5 and up.

Ready for Delivery

STRAIGHT and OFFSET TYPE HAND WHEELS

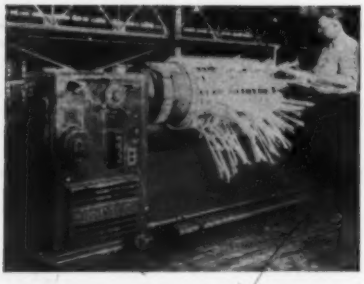
STANDARD CAST IRON HAND KNOBS

SOLID ROTARY
MACHINE HANDLES

MALLEABLE IRON LEVERS

Send for Complete Catalog

MACHINE PRODUCTS CORPORATION
6771 E. McNICHOLS ROAD • DETROIT 12, MICHIGAN



ized reservoir and gear pump. The oil is distributed to all bearings and moving parts by a series of oil lines and rifle drilled shafts. A conveniently located filler plug is located at the front of the machine and directly below this are two gauges. The upper gauge shows the circulation of the oil while the lower gauge shows the height of the oil in the reservoir.

The spindle has a clockwise rotation. The nose is tapered and of sufficient diameter to accommodate any type of driving flange. It is also tapped 2"—8 threads L.H. to receive a threaded center. To the left of the speed control dial is mounted the counter. This instrument calibrates each complete rotation, also tenths of revolutions of the work. At the left of the counter is a reset lever for returning all numbers to zero.

The driving motor is mounted in the base of the head on a hinged shelf and the drive to the initial driving shaft is thru three V-belts entirely enclosed. Also located in the base of the machine is the control foot lever which is always under spring tension. Down pressure on the lever causes the spindle to rotate and when this pressure is released, the work will stop instantly, due to the worm drive in connection with the multiple disc brake.

The machine can be furnished with or without the tailstock. The tailstock unit consists of a one-piece casting which houses an adjustable spindle, movable longitudinally by means of a nut and screw and provided with a single binder-plug and locking handle. End thrust is taken on ball thrust bearings. The spindle is provided with a No. 4 Morse taper and is furnished with a dead center as standard equipment.

On installation, where the tailstock is used, the unit is mounted on T-slotted rails anchored in the floor and any required center distance can be provided.

Additional information may be obtained by writing directly to Dept. BB at the factory.

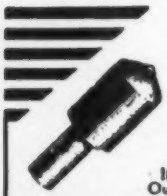
GLOBE BAND SAW

The Globe Products Manufacturing Co., 3380 Robertson Boulevard, Los Angeles, California, manufacturers of Globe Millers, Hand Screw Machines, Boring Bar Holders and Boring Bars, Dividing Heads, Vises, Bed Turrets and Cross Slides have recently added a 12½" wood Band Saw to their line of machine tools.

This saw is unique in construction, in that all the castings are aluminum. It is of exceptionally rugged construction and its weight is approximately half of saws the same size made by other manufacturers. The upper wheel and the guide wheel shaft are equipped with double sealed ball bearings and the saw is designed so that in addition to wood it will cut light metals.

This saw is designed to take blades from ¼" to ¾" in width and 78" long. The table may be tilted to 45 degrees and the guides operate on ball bearings.

This saw is already in production and deliveries are being made.



DIAMOND ACME TOOLS

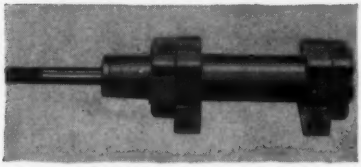
Diamonds vary in quality and it is important to use the proper kind for a given job. "Bargain diamonds" are not an economy.

If you don't know diamonds know your diamond dealer. Our 45 years in this field merits your confidence.

ACME DIAMOND TOOL CO.
15 MAIDEN LANE, NEW YORK, N. Y.

HYDRAULIC CYLINDERS

Hydraulic cylinders with seven standard mountings which cover most needs in initial equipment are announced by Na-



tional Hydraulic Co., Inc., Dept. BB, 4505 Oakwood Blvd., Melvindale (Detroit) Michigan. The cylinders are furnished in bore sizes of 1" to 12" with stroke of any length and for operating pressures up to 1500 psi with a 5-1 factor of safety.

A novel construction that has eliminated tie rods and streamlined the Natdraulic cylinder is said to make practical a more simplified design of the machines in which it becomes a part. Other features include cast Meehanite heads, long bronze side-thrust bearings, special alloy steel rods, alloy steel seamless tubing bored and honed to a mirror finish. All tolerances and concentricity are held well within given limits.

Special cylinders are designed and engineered for special tooling, including forged cylinders for highest commercial pressures.

INSERT ROLL FOR TUBE MARKING

A new style of insert roll has been developed by the M. E. Cunningham Co., 228 East Carson St., Pittsburgh 19, Pa., to provide an economical method of marking grade identification, company symbol, weight per foot and other required marking on steel tubing. This marking is done after the final operation on the sizing rolls. A special steel holder is also available complete with shaft for attaching to machine.

The new insert roll is made of Safety Mecco alloy steel in three separate parts: (1) Side ring and hub machined from solid bar of high alloy steel. (2) Type insert ring, mortised for number of inserts required. (3) Locking ring which holds type inserts in place. The insert ring

Why BREAK 'em ?

HOW MUCH DOES IT COST YOU TO REPLACE BROKEN DRILLS, TAPS, REAMERS, ETC.?

Added to losses due to work spoilage, labor of extracting broken pieces and production line tie-ups, it can be a formidable total.

You can cut these mounting losses easily by the use of BUFFALO TORQUE CONTROL COUPLINGS. Adjusted at a fixed torque to perform a particular operation, these couplings automatically throw out when overloaded, thereby releasing the driving power thru the couplings themselves, but automatically re-engaging and re-assuming the driving power when the over-load has been removed.

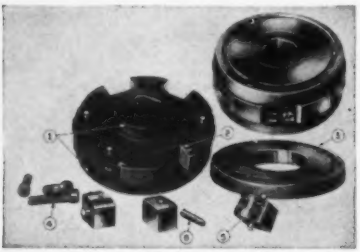
Available in production and utility models, in sizes for all operations on drilling machines, lathes, turret lathes, boring mills, etc. Also manufactured as stud drivers, nut setters and transmission types.

Machine Tool Type Production Model

Descriptive Bulletin No. 1007 sent on request

BUFFALO MACHINERY CO., INC.
838 Grant Street — Buffalo 13, New York

is locked to the side ring by means of Allen head set screws (4). Inserts (5) are engraved with the face radiused slightly less than outside diameter of



the type ring, and are held securely by steel pins (6), which fit into holes drilled into side ring and locking ring.

The new insert roll includes the Company's patented insert ring in which the engraved lettering is the same height as the solid sections between inserts. This provides the necessary friction for carrying the roll along the pipe or tubing, to properly space the lettering and eliminate the "jumping" and resulting extra wear on front and back ends of letters as they make contact. According to the manufacturer, character life is increased between 10% and 25% as a result of this patented engineering feature.

SOLDERING FLUX IN STICK FORM

Handy as a pencil, convenient to use, are the features of the new Flux-Stik, a specially designed soldering flux molded into clean, easy-to-use stick form.

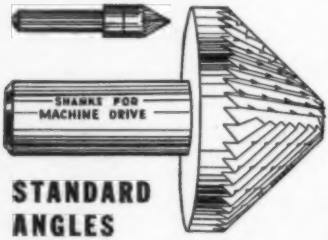
Flux-Stik is non-acid, yet is claimed to thoroly and quickly dissolve the oxides of metals and thus prepare a free, clean surface for the solder to alloy itself firmly with the metal. With Flux-Stik no cleaning of the metal is necessary.

Flux-Stik, it is reported, can be applied equally well either to hot or cold metal. It permits the solder to flow easily and smoothly and to adhere firmly to the metal. It is reported to insure perfect joints.

Flux-Stik can be used for overhead, inaccessible and out-of-the way soldering locations where cleaning of the metal is clumsy and inconvenient. It can be used for sweat joints of copper or brass tubing.

INSIDE DEBURRING CUTTERS

HIGH SPEED STEEL



STANDARD ANGLES

30° - 45°
STOCKED IN 8 SIZES EACH ANGLE

SPECIAL ANGLES FROM STOCK BLANKS

HANDLES FOR HAND USE (4 THREAD SIZES)

RADIUS TYPE 10 SIZES

WRITE FOR BULLETIN NUMBER 15-I

SEVERANCE TOOL INDUSTRIES INC.
722 IOWA STREET
SAGINAW, • MICHIGAN

manholds, traps, elbows, piping, sheet metal, cabinet work, refrigeration and heating coils, etc.

Flux-Stik is made by Lake Chemical Co., Dept. BB, 607 N. Western Ave., Chicago 12, Ill.

NEW TECHNICAL PERIODICAL

Reynolds Metals Company has inaugurated a new service to the metalworking industries by establishing the "Technical Advisor", a monthly technical paper devoted to publicizing latest recommendations on how to use aluminum mill products most effectively.

The first issue, just published, carries a condensed technical description of the two main processes in the production of aluminum. A question-and-answer section is dedicated to making available to a wider audience the answers to many questions sent in to Reynolds technical men.

An outstanding feature of the publication is the technical process studies included serially. The current series is devoted to the welding of aluminum, with this first issue covering the general factors involved, weldability of the various aluminum alloys, application of gas welding, edge preparation for gas welding.

The periodical is sent free upon request to Technical Editorial Service, Dept. BB, Reynolds Metals Co., 2500 So. Third St., Louisville 1, Ky.

Announcing

the new "Y" series

PRODUCTIMETERS

To the growing line of Productimeter counting units is added a small, non-reset rotary counter . . . light of operation . . . constructed for high speeds . . . available in three to eight figures capacity.

"Y" models can be incorporated as integral parts of machinery . . . office appliances, laboratory equipment, meters, voting machines and electronic devices.

Send for complete information!

There's a Productimeter for practically every purpose and application, from these small "Y" models to large, heavy duty counters.

DURANT MFG. COMPANY

1928 N. Buffum St. Milwaukee 1, Wis.

PRODUCTIMETERS THE SPEEDOMETERS OF INDUSTRY

128 Orange St. Providence 3, R. I.

Buy KIPP AIR GRINDERS Because

The RPM's stay up while grinding ... not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind — not just rub. The speed of Kipp air grinders drops but slightly when put to work. That means better work — longer wheel life.

Buy Kipp air tools for best results, lower prices.

MODEL JA
50,000 R.P.M.
$33.25
IN U.S.A.

Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

MADISON-KIPP CORP.
207 Waubesa St., Madison, Wis., U.S.A.

- *Skilled in* DIE CASTING *Mechanics*
- *Experienced in* LUBRICATION *Engineering*
- *Originators of Really High Speed* AIR TOOLS

DRILL CHUCK SELECTOR

Selecting the right drill chuck for any straight shank drill is now made easy by means of a "slide-rule" type selector offered by Scully-Jones and Co., 1907 S. Rockwell St., Chicago.

With one simple setting of this selector, it is possible to determine instantly the catalog number of the Style "B" Drill Chuck to be ordered, thus providing a great time-saver for engineers, draftsmen, toolroom supervisors and machine operators in requisitioning drivers.

In addition, the selector shows recommended speeds and feeds for drilling various types of materials.

Selectors may be obtained without charge by writing, on your company letterhead, direct to Scully-Jones and Company at the above address.

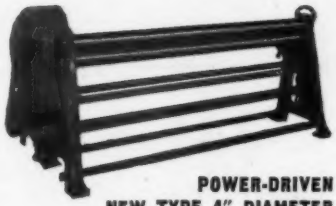
SAMSON SKID LIFT TRUCK

This truck was designed to provide means of moving or elevating a loaded skid to machine bed or bench by hand or motorized at the least investment in equipment.

It may be used for leveling sheets of material at machines during processing,

LOWN

SLIP ROLL FORMING MACHINES



POWER-DRIVEN
NEW TYPE 4" DIAMETER

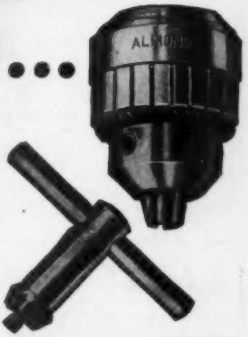
A sturdy, heavy-duty former with rolls of tough steel, turned and polished. Supplied complete with motor and drum type reversing switch. Sizes range from 38" to 98" roll length. All three rolls may be power driven if desired. Heavier and lighter machines also available. Write for details.

Dealers in Principal Industrial Cities

SAN ANGELO FOUNDRY & MACHINERY COMPANY
SAN ANGELO, TEXAS, U. S. A.

ALMOND...

Triple Jaw **DRILL CHUCK**



The Almond Three-Jaw Drill Chucks were pioneers in the field of drill chucks. Since 1872 they have played a necessary part in the logical procedure of machine developments.

Almond Chucks are furnished in nine sizes with capacities from 3/16 to 1". They are made for heavy and light duty types with taper or threaded arbor hole — to fit all machine tools and portable tools.

Write for complete details.

The Original Manufacturers of Drill Chucks

T. R. ALMOND CO.
ASHBURNHAM, MASS., U.S.A.

enabling the operator to work at the most convenient level: transporting dies to and from machines to storage; moving storage battery units to and from trucks to charging racks; raising the front ends of the lighter cars to permit of tire repairs and replacements; elevates drums of liquid for emptying and many other applications which we have not heard about to date.

The truck is made in three sizes and three widths of elevation platform. The specifications of the Standard Model which covers the majority of uses is shown in detail at the left below. The other sizes are obtainable at slight extra cost.

While widths of elevating frame may vary in width Viz, 20", 24" & 30", the length of the platform remains the same 43¼". It is found that this length permits of the maximum of mobility without being clumsy.

Construction is case, semi-steel; worm, steel hardened and ground and polished: worm-wheel, semi steel large teeth, both worm and worm-wheel shafts run on ball bearings of a grade acceptable to the Government; Double cables over idler sheaves for easy operation with crank of normal length. Angle iron frame permits great strength and lightness. The stiffening plates between raising members gives tremendous rigidity even when elevated with load.

Further information is available from Dept. BB, General Sales & Engineering Co., 7358 N. Clark St., Chicago, Ill.

PROTECTION FOR HANDS

Many line production jobs that require only light protection on palm, first finger and palm side of little finger, can be speeded up safely with this new hand-

guard put out by Industrial Gloves Co., Dept. BB, Danville, Illinois.

As illustrated, the guard leaves thumb and finger tips free for picking up material; provides complete flexibility due to open-back construction. The guard is made of split cowhide—excellent wearing leather; steel stitched thruout. The elastic web band on the back means a snug comfortable fit—cool—easy on and easy off.

Sizes for men and women may be had in pairs or for right or left hand only as required on any certain operation.

Write the manufacturer for sample.

For Fast, Accurate Metal-Cutting Use

KENNAMETAL CEMENTED CARBIDE
TOOLS, BLANKS, and MILLING CUTTERS
KENNAMETAL Inc.
LATROBE, PA.

GAGES 50% OFF

All sizes thread plugs, thread rings, pipe plugs and rings, roll thread snaps —our $100,000 stock of new VARD gages to be sold now. Many specials included at price of standards. Send us your orders today. We guarantee.

PAUL B. SLATER CO.
2335 E. 8th St. Los Angeles 21

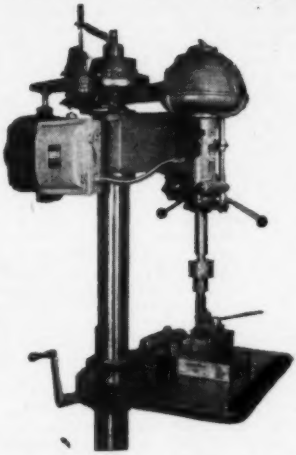
REICH 3-WAY
PRECISION TEST INDICATOR

Lifetime conical bearings, stainless and non-magnetic. Sturdy construction, no returning for adjustment or service. .014" reading.

Price $6.50. Write for folder.

J. R. Reich Manufacturing Co.
45 E. Stroop Rd., Dayton 9, Ohio

THREAD-ALL Tapper



PRECISION TAPPING !! LICKED !!

By Converting Any Drill Press into a Precision Tapping Machine.

Check these advantages:

Handles small taps without fear of breakage. Takes sizes up to 1½" with ease.

Gives precision tapping without need of lead screws.

Electro-magnetically controlled positive depth setting.

No adjustments required for tap sizes.

Silent forward and automatic high speed reverse action.

Taps right or left hand without adjustment.

Machine may be used for drilling, reaming, counterboring, etc. without adjustment.

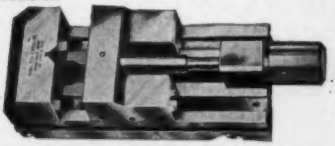
Write for full details.

GRUEN GAUGE CO.
10039 Marcus Ave. Detroit, Mich.

IDEAL'S

Anglemaster Sine Vises

Ultra Precision

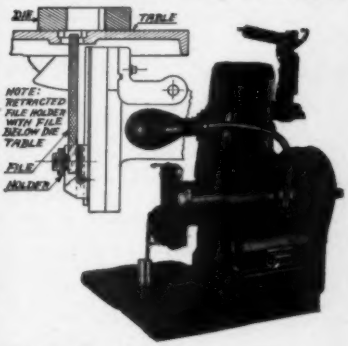


NOTHING FASTER — for Surface Grinding, Inspection!
NO CLAMPS! NO STRAPS!

- Simultaneous squaring and paralleling of work —
- Fast, accurate angular set-ups.

NEW RETRACTABLE DUPLEX No. D-5

Punch & Die Filing Machines



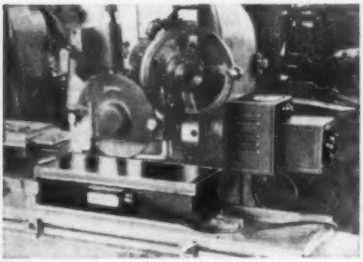
Exclusive!

- No die lifting over file — especially heavy or small-hole dies.
- No accidental file breakage.
- Check work right on the die table.
- Leave overarm in set filing position.

IDEAL TOOL AND DIE CO.
733-735 CONGRESS ST.
SCHENECTADY 3, NEW YORK

COMBINATION RECTIFIER AND DEMAGNETIZER

Hanchett Mfg. Co., of Big Rapids, Mich., is furnishing its new laminated top Hermeti-Coil magnetic chucks, sizes 6" x 24" and smaller with an a-c combination rec-



tifier and demagnetizer called the "Neutrofier." This compact unit may be mounted anywhere for the operator's convenience and it can be furnished for operation from any alternating current outlet.

By a snap of the control the unit will demagnetize the magnetic chuck and parts completely and automatically. A few seconds is required for the demagnetizing operation. Besides being used as a holding device the magnetic chuck can be used for demagnetizing many other parts that may have become magnetic from other operations. Hanchett is now offering the Neutrofier in combination with t' laminated top magnetic chucks.

Write to Dept. BB for further information.

WOERNER PROFILE CUTTING MACHINE

Oxy-acetylene machine, using any standard blow pipe, cuts any specified profile or shape on pipe, tubing or bar. The spindle is hollow, with self-centering chuck atttached to both ends for locating and holding pipe or bar. It is rotated thru reduction gears by hand or variable speed electric motor enclosed in cabinet.

The profile shapes are predetermined by a pattern guide placed on top of the machine which travels its entire length thru each revolution of the spindle. The cut edge is at once sufficiently finished and ready for welding or other fabrication.

For square cutting, the clutch is re-

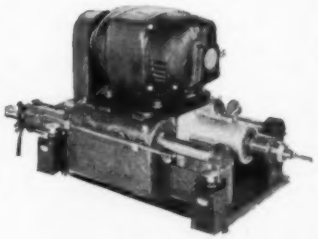
THE DORR AUTOMATIC DRILL HEAD

A sturdy, precision-built drilling unit capable of handling production jobs where maintained accuracy and uninterrupted performance is essential.

In addition to drilling operations, this head is likewise suitable for reaming, tapping, counterboring and various types of milling operations.

The standard, or basic, unit is equipped with hand-operated air valve for controlling rapid traverse movement of carriage. The drill is moved forward to the work by rapid traverse and the rate of drilling feed is then controlled by means of a hydraulic check adjustable to any desired rate of feed. Maximum recommended drill size for the standard unit is ¾ inch in steel. Maximum length of stroke is 5 inches.

Equipped with ¾ H.P. 1800 R.P.M., 220 Volt, 3 Phase, 60 cycle motor and adjustable v-belt pulleys to produce spindle speeds from 650 to 4500 R.P.M.



OFFICES IN PRINCIPAL CITIES

FOR FURTHER INFORMATION, PLEASE CONTACT

SPECIALTY EQUIPMENT & MACHINERY CORP.

230 PARK AVENUE NEW YORK 17, N. Y.

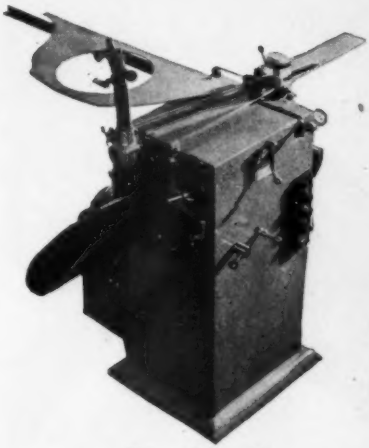
leased from pattern carrier by simply throwing a lever, allowing pattern carrier to remain in neutral position.

When required, a radio tube control system can be attached, as shown in illustration which will provide accurate spindle speed control.

The machine can be furnished in two standard sizes or special made-to-order sizes for certain requirements.

Time saved in cutting of accurate and uniform profile shapes in any form is on an average of a minute and a half to forty-five minutes by hand. It is unequaled for quantity uniform production.

For more information on this product write to Heath Engineering Co., Dept. BB, 212 Olive St., Fort Collins, Colo.



A total of 5,600 veterans with certain disabilities received automotive conveyances at Government expense by the end of 1946, Veterans Administration said.

PRECISION MACHINE GROUND 1/8" CARBIDE BURS

One 1/8" Atrax Carbide Bur did the work of more than 100 mounted grinding points.
Another 1/8" Atrax Carbide Bur did the work of 120 high speed steel burs.
And — Atrax Carbide Burs are used extensively on tough materials and hardened steel 65 Rockwell C.

Ask for bulletin A51 H

The Atrax Co.

FRANCIS AVE. AND DAY ST.
NEWINGTON 11, CONN.

These low-cost

DIAMOND-STUDDED WHEEL DRESSERS

. . . eliminate re-setting time and expense!

A big improvement over single-point stones! When the diamond cutting surfaces wear off, you don't send *this* dresser out for re-setting—instead, a simple ¼ turn in the holder presents a new layer of diamond points—ready to go to work at once! You save the expense of re-setting—you save time, too (the dressers never leave your shop). And you get *uniformly fine dressing* because dresser efficiency doesn't depend on the unpredictable quality of *one* stone, but upon the average of MANY.

Layer upon layer of selected industrial diamonds are anchored in a special Carboloy Cemented Carbide matrix to prevent accidental diamond loss. Particles large and small are held securely throughout dresser's entire useful life.

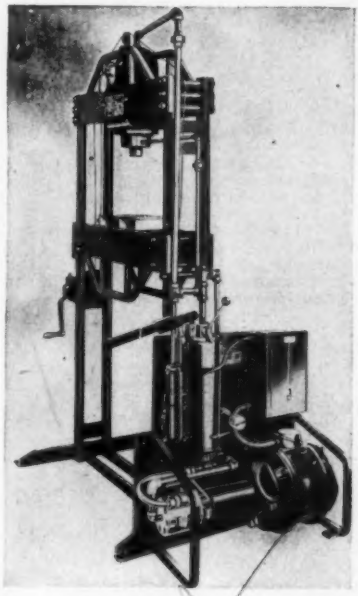
Available in 3 sizes for rough, semi-finish and finish dressing. Economically-priced. Investigate this money-saving method at once—leaflet SA-127 answers all questions—write for it today.

CARBOLOY COMPANY, INC.
11139 E. 8 Mile Blvd., Detroit 32, Mich.
Also Sold By Leading Mill Supply Distributors

CARBOLOY

HYDRAULIC ARBOR PRESSES

A full line of motor-driven hydraulic arbor presses—25, 50, 60 and 75-ton capacities has been announced by K. R. Wilson, Buffalo, N. Y. These presses are designed to provide industry with low-cost, high

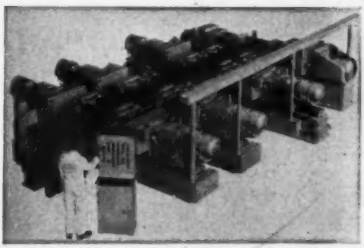


production units capable of relieving heavier presses of short runs or small work. Construction of the presses is extremely rugged—frame is made of hot rolled steel. Bed plates are trussed for added strength with all joints electrically welded. Bed is easily raised or lowered by means of a cable drum and crank. Since the frame is a weldment, most press dimensions may be changed to meet any particular problem at slight extra cost. Operation of the ram is controlled by a conveniently located motor valve control which is actuated by a flip of finger and thumb. The motor driven hydraulic pump used is a Seco radial type ranging in capacities from 3000 psi to 10,000 psi, and are practically foolproof in operation

under normal care. All units are equipped with the exclusive KRW Pressure By-pass Valve, permitting required tonnage pressure to be accurately set and then maintained in successive operations. Another KRW feature is the spring actuated, quick return ram which returns the ram to the "open" position instantly, when the control lever is released. These KRW Motordrive units are also available for converting existing KRW hand operated arbor presses.

HOLEWAY PROCESSING MACHINE

The National Automatic Tool Co. Inc., at Richmond, Ind., has developed an automatic processing machine which they say is capable of producing 90 engine blocks per hour. This machine, as illustrated, in-

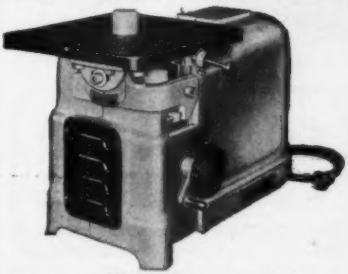


volves 19 stations and is arranged to complete the following operations: drills 23 holes ranging from 3/16" to ½"; combination drills and countersinks one 7/16" hole; countersinks 14 holes ranging from 3/16" to ½"; taps 15 holes ranging from ⅜" to 7/16" tap; drills 19/32" diameter oil gallery hole clear through engine block in 12 successive steps; taps oil gallery both ends ⅜" pipe tap.

In completing these operations this new machine provides automatic control necessitating one operator. It automatically advances the engine blocks from station to station, clamps and unclamps them in each position, and synchronously performs the operations at all stations as the blocks travel thru the Holeway machine. The blocks are then automatically ejected onto a roller conveyor at the completion of all operations.

For further information write National Automatic Tool Co. Inc., Richmond, Ind., Dept. No. 24.

for PRECISION FINISHING of Hardened Steel Parts



THE *Milwaukee* PROFILE GRINDER

. . . promotes extreme accuracy in the precision grinding of hardened steel parts for tools, dies, jigs, fixtures, cams and templates. It is especially adapted to the grinding of curved surfaces and irregular, inside contours, to close tolerances. Lines are extremely easy to follow.

The *Milwaukee* DIE FILER

A companion machine, is designed primarily for filing, sawing and lapping straight lines, plane surfaces or sharp corners in the softer metals, preparatory to hardening.

USE BOTH! The shop with both machines is equipped to handle a full range of "tool and die" work quickly and accurately at low cost! Both are stocked and sold by Machinery and Mill Supply Dealers!

Milwaukee
CHAPLET & MANUFACTURING CO.
1027 S. 40th ST., MILWAUKEE 4, WIS.

immediate delivery

ADAMAS

CEMENTED CARBIDES

FOR METAL CUTTING AND WEAR RESISTANCE

Standard and Special Shapes and Grades

ADAMAS CARBIDE CORPORATION

Producers of Cemented Carbides in All Forms

40-30 23rd STREET
LONG ISLAND CITY 1, NEW YORK

Hammond of KALAMAZOO

"101" Operations Made Easy!

Model F-2 FLEXIBLE BELT Bench or Floor Type

Grinding, Polishing, Deburring, Chamfering on irregular or regular shaped parts. Soon pays for itself.

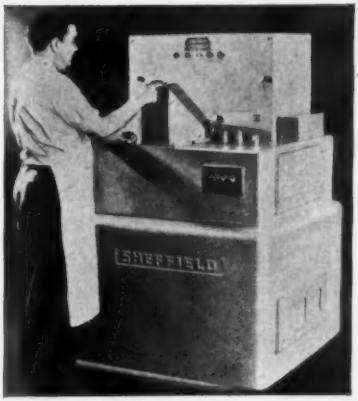
SHIPMENT FROM STOCK

Hammond Machinery Builders Inc.

1614 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

AUTOMATIC GAGER

An "Airlectric" automatic gaging machine that checks the average outside



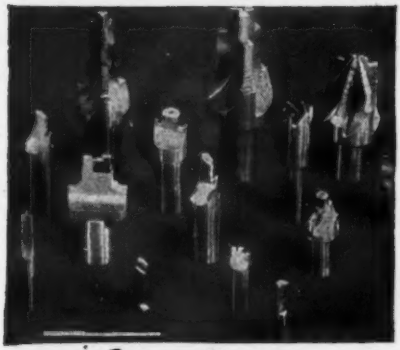
diameter of shock absorber pistons and segregates them into eight classes has been developed by the Sheffield Corporation of Dayton, Ohio. It is said to check and classify pistons at the rate of 3,600 per hour.

After the pistons are ground on a centerless grinder, they proceed on a conveyor belt to the operator of the machine. He removes them from the conveyor and places the parts in a chute, so designed that it will only permit pistons to be entered in the proper manner. The parts then proceed to the bottom of the chute where they pass under a Electrichek gaging head, which actuates devices that automatically rejects any excessively oversized parts. These parts can be salvaged and reground.

The remainder of the parts are removed from the Electrichek gaging station and inserted in a tungsten carbide air ring. The air ring is connected to a series of "Airlectric" gaging heads that determine the size of the part and lights one of the individual signal lights located directly behind the chute. Each of the lights has a prearranged color band around the diffusing lens to indicate the size of the piston. The lights will only come on if the part is within the minimum and maximum tolerance limits. This permits the operator of the machine to determine the size of the pistons and informs the

FORM-GRINDING

. . is our business!



• Your own products are *your* specialty. Why not let us form-grind the illustrated types of form flat-drills in which *we* specialize?

Our entire organization is keenly interested in "Form-Grinding" and its problems. Facilities include J. & S. "Form-Dressers," J. & S. "Form-Grinders," and all necessary form-grinding equipment. The "know-how" developed by supplying some of the outstanding manufacturers in industry, is available for your quality tool requirements—and at competitive prices. Your requests for quotation are solicited on that basis.

Write for booklet or send prints today!

J&S TOOL CO. 477 Main St., East Orange 2, N. J.

Manufacturers of "Fluidmotion" Radii and Angle Dressers

Help Increase Production

use the

This light, easily handled instrument when used by machine operators, or on final inspection, serves to increase production, reduce scrap and assure a more uniform product. It is a reliable, precision indicator designed for rapid, convenient and accurate measurement of internal diameters. The scale range is: Plus or minus 0.001" graduated to 0.0001" and minus 0.020" graduated to 0.0001".

It can be set to any required size direct from Johansson Gage blocks or master ring.

SWEDISH INTERNAL INDICATOR GAGE

SWEDISH GAGE CO., OF AMERICA

8900 ALPINE AVE., DETROIT 4, MICH.

operator of the grinder to what range he is grinding the parts.

Pistons are ejected from the air ring and, depending upon size, pass into the corresponding receptacle. Each piston is segregated and classified as to undersize, oversize, or one of the five acceptable classifications.

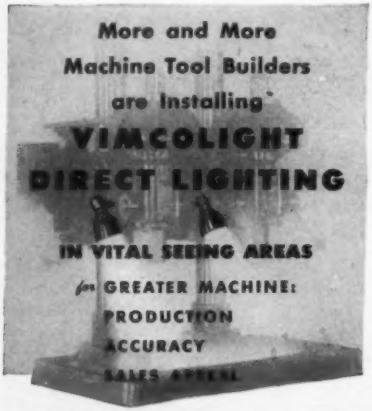
EXPANDS PRECISION AIR CHUCK LINE

Two larger sizes have recently been added to the Cleveland - made Erickson line of Precision Air-operated Chucks. The No. 501-AT has the following ranges: in 1/32" steps—1⅝" to 1", 31/32" to ½", 15/32 to ¼"; and 1⅜" to ¾" hex in ⅛" steps. The No. 601-AT has the following: in 1/32" steps—2⅛" to 1½", 1-15/32" to 1", 31/32" to 11/16"; and 1⅞" to 1⅜" hex in ⅛" steps.

The manufacturer claims the same fundamental advantages for all sizes; viz., collapsibility range of 1/32", replacing seven standard single-purpose collets; uniform, vise-like grip along entire length of collet, which makes possible the holding of glass, gold and ceramic tubing, ferrous and non-ferrous metals, and other materials for second operations, as well as marked reductions in breakage of tools and parts on drilling, buffing, polishing, honing and other operations. The manufacturer claims that greater feeds and speeds are possible, that set-up time is markedly lowered, and that rejects are greatly reduced. Made by Erickson Tools Division of Erickson Steel Co., 2309 Hamilton Ave., Cleveland 14, Ohio.

Veterans leaving the armed forces are not eligible for unemployment or self-employment allowances while they are receiving terminal leave pay, Veterans Administration said.

Veterans Administration is operating 123 hospitals now, but it eventually expects to have more than 200 in order to handle the anticipated load of veteran-patients.



VIMCOLIGHTS are available in sizes and styles for every machine tool need. Write for details.

VIMCO
MFG. COMPANY, Inc. 109 BRAYTON ST. BUFFALO 13, N.Y.

Save Space and Lifting

Yohe Racks take less floor space—hold more stock and require less lifting. Four arm rack, 51" high stacks, 10,000 lbs. Five arm rack 57" high holds 12,000 lbs. flat or round stock—at safe lifting heights. Use against wall or back-to-back in center of room.

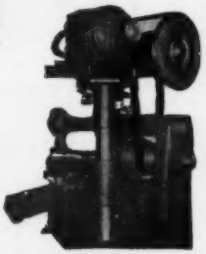
Let us send details and prices.

WM. S. YOHE SUPPLY CO.
503 Mahoning Rd., N.E. Canton, Ohio

MODERN...

MOTOR DRIVE

Prompt Shipment



Save floor space, save power, and eliminate line shaft expense by installing MODERN MOTOR DRIVES in your plant. All drives are ball-bearing equipped and designed to fit practically every machine tool. Soundly engineered for long life.

MODERN MOTOR DRIVES DIV.
NICHOLS ENGINEERING CO.
2400 W. MADISON ST., CHICAGO 12, ILL.

WHITNEY-JENSEN PRODUCTS
10 YEARS EXPERIENCE

Nos. 10-11-12

BALL BEARING PUNCHES

CAPACITY — 3/8" THRU 1/4"

PUNCHES and DIES
3/32" THRU 1/2" BY 1/64" VARIATION

HANDY FOR MAINTENANCE

Write for Literature

WHITNEY METAL TOOL COMPANY
115 FORBES ST • ROCKFORD ILL.

S&D DOWEL PINS

Immediate Delivery!

Standard Size Dowel Pins from 1/8" to 1" diameter and from 3/8" to 6" length supplied in .0002 and .001 over basic sizes. Unless otherwise specified, .0002 oversize will be furnished.

SCHULTZ & ANDERSON CO.
109 Edison Place, Newark 5, N. J.

YOST DRILL PRESS VISE

This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	3½	12½
2D	5	5½	23

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

YOST MFG. COMPANY
1335 SO. MAIN ST.
MEADVILLE, PENNSYLVANIA

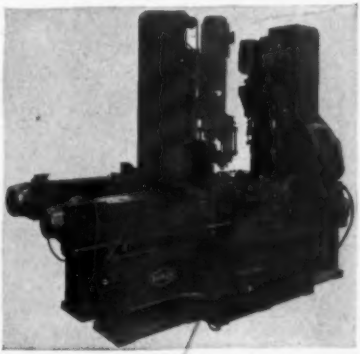
SPECIAL MACHINE PERFORMS MULTIPLE OPERATIONS ON GAS REGULATOR BODIES

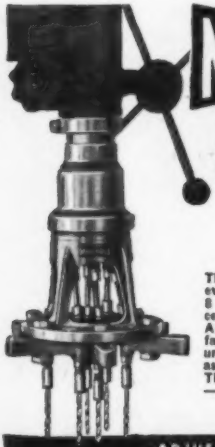
A multiple unit multiple operation type machine, designed and manufactured by Baker Bros., Inc., Toledo, Ohio, for the Reliance Regulator Co., Alhambra, Cal., completes all drilling, boring, reaming, facing and tapping operations in production of gas regulator bodies. The material handled is cast iron.

This machine has a four-station, automatic power indexing table, each station arranged for rechucking one part, and the chucking of one new part. Built around this index table are ten independently fed auxiliary units, consisting of four self-contained hydraulic units mounted in horizontal and vertical planes, one inverted rack and pinion fed unit, and five single spindle lead screw tapping units also mounted in horizontal and vertical planes.

Operations in parts present themselves from five directions, and all holes from the horizontal units have two separate operations. The main hole from the vertical plane is machined in five separate operations.

Flexibility is required in the machine, due to various sizes of the regulator housings, some being ¾" - 1" - 1¼" pipe tap and flange holes varying with 8 holes on one bolt circle, and 10 holes on a different bolt circle. The multiple head furnished on the unit at first working stations has 18 spindles, arranged to pivot to accommodate varying bolt circles without



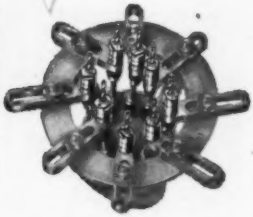


MULTI-DRILL
AUTOMATIC

Pats. Pending

6 or 8 SPINDLES

DRILL UP TO 6 or 8 HOLES AT ONE STROKE in ANY PATTERN WITH MULTI-DRILL



FITS *ANY* DRILL PRESS

The 8-spindle unit in the MULTI-DRILL line brings your single spindle tools even greater production capacity and wider operating range. You can drill up to 8 holes at one stroke in ANY hole pattern on or within a 9" circle . . . ⅛" center distances . . . drill sizes 1-32 to 3-8". (Special adaptations available). All the features which make MULTI-DRILLS preferred tools are built in . . . fast, easy positioning of locating arms . . . heavy duty, long-life block-type universal joints . . . "Oilite" lifetime bearings . . . precision collet spindle assemblies and rugged construction throughout assure long trouble-free service. The 6-Spindle MULTI-DRILL handles any hole pattern on or within 5" circles —⅛" min. centers.

Write for Catalog Sheets and Complete Details

COMMANDER MFG. CO.
4227 W. Kinzie Street
Chicago 24, Ill.
Tel. SACramento 4545

removing head from unit.

Special machines such as this—which automatically perform multiple operations in drilling, boring, reaming, facing or tapping—are regarded by the Baker firm as a tool with which many industries today can obtain increased productivity.

BEAM HANDLING

Beatty Machine & Mfg. Company, Dept. BB, Hammond, Indiana, announces a new, simplified, low cost spacing table, designed to handle I-Beams of varying weights and sizes for flange punching without any adjustment of the spacing table.

This handling is accomplished by carrying the beam on the underside of the top flange, which, regardless of the size or weight of the I-beam is always at die level and free to pass over the dies. Previously, I-beams were carried on the underside of the bottom flange, which called for adjusting the rolls to meet varying sizes of beams.

When a beam is to be placed on the table, the arm carrying the one set of rolls is opened by means of an air cylinder. When the beam is partially lowered, into the table, the arm is closed by air cylinder, and the beam is fully lowered until the underside of the upper flange rests on the roll.

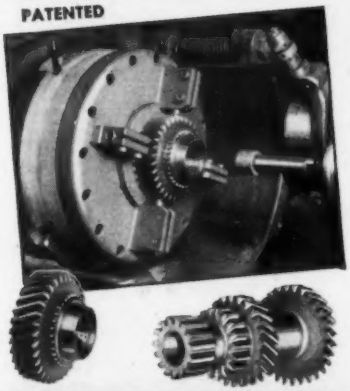
The spacing table carriage is arranged to grip the top flange of the beam for movement during the punching operation. All rolls and roll shafts are mounted in self-aligning anti-friction bearings and the spacing table carriage is likewise equipped with anti-friction bearings thruout for ease of operation. Carriage and table are also equipped with gear rack on both sides to maintain an even movement of the carriage down the length of the table.

PYRO THE SIMPLIFIED OPTICAL PYROMETER

Unique construction enables operators to rapidly determine temperature even on minute spots, fast moving objects or the smallest streams; no correction charts, no accessories, no upkeep.

THE PYROMETER INSTRUMENT CO.
102-105 Lafayette St., New York, N. Y.

PATENTED



DIAPHRAGM CHUCKS

Look, a high speed, precision chuck with no parts to wear out! *Result:* Maximum accuracy, minimum maintenance! *Because* the Woodworth design assures the ultimate in concentric chucking. *Obviously*, it will solve your precision chucking problems, as it has already for large manufacturers of gears and other production parts. Send your precision chucking problems to us—at no obligation.

MECHANICALLY OR AIR OPERATED

•

ACCURACY YOU CAN TRUST

WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION • 1300 E. NINE MILE RD., DETROIT 20, MICH.

MOTOR DRIVE UNIT

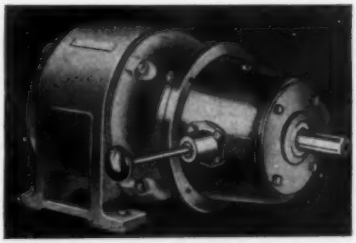
Ward Leonard Electric Co., Dept. BB, Mount Vernon, N. Y. announces the development of their new Small Motor Drive for Rheostats. This motor drive unit is designed for remote and automatic operation of single or multiple stamped steel rheostats controlling generator voltages, motor speeds, lamp intensities, and numerous other rheostat applications.

Available for a-c and d-c 115 or 230 volt operation, supplemental Bulletin 60A Motor Drive Units are suitable for control of 13" SS rheostats up to three plates. Standard units have 30 or 60 seconds travel from the "all resistance in" to the "all resistance out position" but can be furnished for shorter or longer travel time. Constructed on a 13" diameter steel plate these small motor drives are intended for mounting on extended rheostat feet.

On order motor drive units can be furnished for high speed return, with presettable limit switches, with longer or shorter travel time intervals and other special features.

NEW TWO-SPEED MOTOR TRANSMISSION

A Two-Speed Motor Transmission—a unit that may be used to replace two-speed motors, with the added advantage of providing special ratios is announced by the Western Mfg. Co., Dept. BB, 3400



Scotten Ave., Detroit 10, Mich. Direct motor speed, neutral point, and any desired reduction up to 6.25 to 1 are obtained thru an automotive-type gear shift lever. Standard reductions are 1½ to 1; 2 to 1; 3 to 1; 4 to 1.

Units manufactured to apply on motor frames, Nos. 224, 225 and 254 are mounted upon flanged-type end shield and can be swiveled about on the face of the flange so that the shifting lever may be in any one of three different positions, 90 degrees apart (either one of two horizontal and one vertical (upright) position). In the larger sizes these new two-speed transmissions are made with modified base mountings, corresponding with legs of motor frame.

Here is a compact, durable, smooth running Belt Surfacer and Polisher—direct motor driven—complete and ready for use. An ideal machine for—cleaning and finishing castings — removing burrs — straightening and finishing dies, stampings, etc. Excellent performance — Adjustment made by hand, no tools needed — Write today for full details.

PRODUCTION MACHINE CO.
GREENFIELD, MASS.

AIR PRESSURE REGULATOR

A. Schrader's Son, Division of Scovill Mfg. Co., Inc., announces the introduction of a new air regulator which is adjustable to function in systems operating at pressures from 150 to 10 lbs. per square inch. Many of these regulators can be used in a system, one for each tool or air-operated machine.

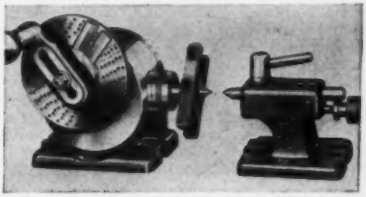
When an air tool is designed to operate at, say 100 lbs. per square inch, and the line pressure is 150 lbs. per square inch, the difference in pressure is ordinarily wasted. With the regulator, air to any working part used in conjunction with air cylinders, machine controls, etc., is delivered at the pressure for which the regulator is set (always less than lowest line pressure), saving wear and tear on the compressor and reducing air costs.

Another important purpose of the Schrader regulator is to keep the pressure at the equipment constant regardless of the sometimes wide variation in the system pressure. The Air Pressure Regulator is furnished with a pressure gauge. For further information write A. Schrader's Son, Division of Scovill Mfg. Co., Inc. Dept. BB, Brooklyn 17, N. Y.

UNIVERSAL DIVIDING HEAD

A new model SD 6½" Universal Dividing Head has just been added to the line of the L-W Chuck Co., 23 S. St. Clair St., Toledo, Ohio.

Tho low priced, the tool is claimed to



have been well built and for accurate work. The head and tailstock are ruggedly designed to withstand hard daily usage on smaller milling machines. The spindle has a tapered bearing and the head tilts to more than 90 degrees in vertical position. The new dividing head comes complete with three index plates for up to 380 divisions.

SEND US YOUR PRINTS FOR Quotations

THREAD GRINDING

Also Internal, External and surface grinding.

BROACHING

SCREW MACHINE PRODUCTS

MAGNETIC INSPECTION

• GEARS •

SPUR WORM

BEVEL HELICAL

TAYLOR MACHINE COMPANY

MANUFACTURERS OF AVIATION & AUTOMOTIVE PARTS

Gear Specialists

1927 EAST 61st ST. • CLEVELAND 3, OHIO

M·B MODEL UTR 60,000 RPM

"UTILITY" Pneumatic GRINDER

A powerful, fast-cutting tool, streamlined in design, easy to handle. Designed for real production work and the toughest jobs. Precision made, excellent balance. Special grease-sealed bearings . . . no lubrication required. Fitted with steel housing, a special safety feature.

Representatives in Principal Cities

M·B PRODUCTS

130-134 E. LARNED ST.
DETROIT 26, MICHIGAN

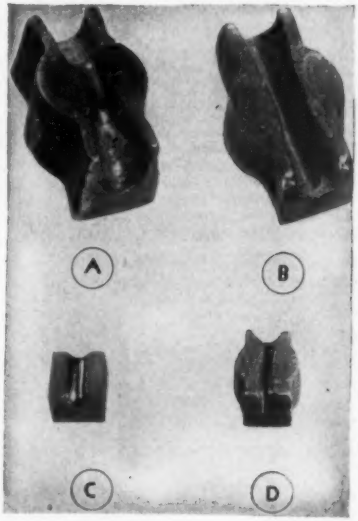
TUNGSTEN CARBIDE WIRE STRAIGHTENING DIES

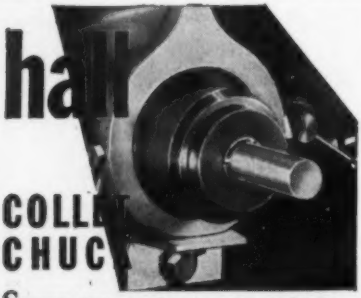
The photograph shows tungsten carbide wire straightening dies (A and C) and the conventional chilled cast iron and brass dies (B and D).

These carbide dies were originally developed by the Adamas Carbide Corporation, 1919 Broadway, New York, N. Y., at the request of the Capitol Steel Corp. of N. Y. The hardened special analysis die they had been using, B, lasted an average of two days due to the harsh abrasive action of scale on the hot roll wire they were straightening for concrete reinforcing rod. Previous difficulties included chipping out of the carbide as a result of the pounding that these dies undergo in a wire straightening machine.

After a short period of trial it was found that for the larger sizes of wire from ¼" to ½" diameter and up, a carbide inset made in a casting, A, would give maximum wear and still keep costs down. For the smaller wire dies a solid carbide die, C, was found most efficient. The carbide dies have lasted over 300 days, operating continuously without requiring work stoppage for replacement and doing a uniformly good job of straightening the wire.

The solid carbide die, C, has a ground and lapped finish which in addition to long life, eliminates scoring and scratching of the wire where finish is important.





SPEED UP production in multiple operations with push-out type Hall Collet Chuck. Full spindle capacity or over. Tremendous grip over or under stock size to .007—without adjustments...no bearings, friction, heat or loss of power. Instant release without stopping lathe.

Two-inch capacity, now only $145
One-inch capacity, $95
Round, square or hex collets, plain—serrated

HALL MANUFACTURING COMPANY
622 Tularosa Drive • Los Angeles 26, Calif.

OPEN-BACK INCLINABLE PUNCH

A complete line of open-back inclinable punch presses is now in production at the Vernon Press Division of the Ran Corp., Richmond, Cal.

Features of the Vernon press include a rigid one-piece frame of cast semi-steel of exceptionally heavy section to assure protection against distortion from overloads. Accurately-machined gibs are extra long to provide lasting accuracy; the entire press is designed for precision, heavy-duty service and long operating life with minimum maintenance expense.

Prompt deliveries can be made on models with 30, 40, 50 and 90-ton capacities with flywheel drive; 50 and 90-ton models with back-geared drive are in production and will be available shortly. Prices and complete data may be obtained by writing Ran Corp., Vernon Press Division, Richmond, Cal., Dept. BB.

ADDITION TO SINGLE ACTION HYDRAULIC PRESSES

E. W. Bliss Company recently extended its line of single action hydraulic presses by installing one of 1,500 tons capacity at the General Electric Company plant in Erie, Pennsylvania.

This housing-type press is shown drawing and piercing .025" thick stainless-steel

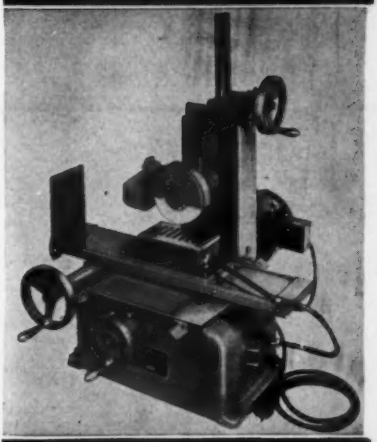
evaporator plates for home refrigerators, and can be used to produce blanked, stamped, formed, pierced, trimmed, drawn, and embossed parts from sheet metal.

The press is equipped with a 12" ram stroke and an hydraulic drawing cushion stroke of 6". Interesting features of the installation include: rugged frame with fully shrunk tie-rods and keyed housings; positive drive of closing stroke; universal electric control, providing for speed change and reversal; safety control, for instant stopping at any point; convenient pressure adjustment; delayed action of the cushion return, allowing slide to raise from work before the finished piece is stripped from the die.

Reversal is effected automatically by either predetermined pressure or position of the slide. Height, installed, is about 183" above floor level.

Further information will be furnished, at letterhead request, by E. W. Bliss Co., Dept. BB, 450 Amsterdam St., Detroit, Mich. The photo is by courtesy General Electric Co.

SANFORD



High-Speed BENCH SURFACE GRINDER

ACCURATE WITHIN .0001

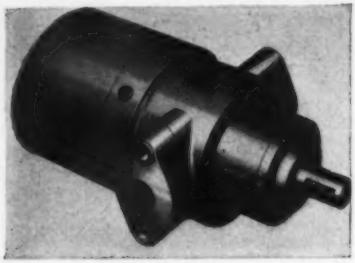
A sensitive machine built to rigid standards of accuracy and workmanship specially designed *"For the job that fits in your palm."*

WRITE FOR BULLETIN

SANFORD MFG. CO.
1020-28 Commerce Ave.
Union, N. J.

ANOTHER FLUID PUMP

A new Denison Fluid Pump has recently been announced. This is one of the high pressure, high volume pumps of the 3500 series. The main feature pointed out



by the manufacturers of this pump is that it combines quiet operation with high pressure and high volume.

Among other advantages which the producers of these pumps point out are:

1—Elimination of all thrust bearings.

2—Two piece shaft that absorbs deflection and minimizes bearing wear.

3—Axial piston design for long trouble-free service.

4—A pressure balanced piston shoe which eliminates all direct contact between shoe and cam plate.

5—A new concept in the placing of bearing load . . . simplified operating principle.

6—Fewer parts . . . more compact design.

There are many applications for this type of pump which can utilize several of the features.

An eight page bulletin has been published which gives specifications and illustrations of this pump and the other pumps in the series. This may be had by writing to the manufacturer, the Denison Engineering Co., Dept. BB, Columbus 16, Ohio.

HI-PRESSURE-HI-TEMPERATURE LUBRICANT

Die Slick No. 5 is a special metal-working lubricant developed for extremely high pressures and/or high temperatures. Used on ferrous or non-ferrous metals, it has been found effective for such applications as hot drawing, hot piercing punches, hot forging, deep drawing, and for numerous other jobs to prevent scoring and sticking of metal in the process of being formed.

Die Slick No. 5 will withstand pressures of more than 100,000 lbs. per square inch and can be used with temperatures up to 2300°F. Can be applied with brush, swab or spray. The compound will not discolor the work pieces, is non-corrosive, non-carbon-forming and causes no objectionable smoke or gases. Contains no graphite. Packaged in 1-gallon, 5-gallon and 55-gal. containers. Manufactured by G. W. Smith & Sons, Inc., 5400 Kemp Rd., Dayton 3, Ohio. Dept. BB.

WASHERS on Tap as You Need Them

When You Make Them The HOVIS Way

Simply invest in HOVIS UNIVERSAL MASTER WASHER DIES. Then 5 small easily removable parts are all you need to change to make a new size washer.

• You can also use the Hovis Master Washer Die as a holder for making various blanks in your own die room, eliminating the cost of new die sets.

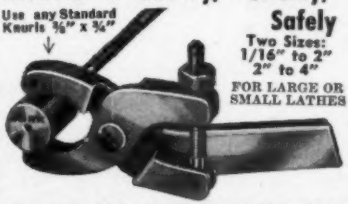
HOVIS SCREWLOCK COMPANY

8096 E. Nine-Mile Rd. Van Dyke, Mich.

Suburb of Detroit

KNURL it Easily, Quickly, Safely

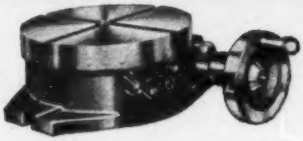
Use any Standard Knurls 3/8" x 3/4"



Two Sizes: 1/16" to 2" 2" to 4"

FOR LARGE OR SMALL LATHES

Joseph B. Fakes & Co., Royal Oak, Mich.



Troyke Rotary Tables
9" to 25"

Carroll Dividing Heads
6" to 12"

TROYKE MFG. CO., 4422 Appleton St., Cincinnati 9, Ohio

SAVE Labor and Time

Eliminate heavy lifting. Cut handling costs. Table swivels and locks in any position. Can be varied 15½" by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

Send TODAY for illustrated catalog No. 2.

MIDWEST TOOL & ENG. CO.
112 Webster St., Dayton, Ohio

LITTELL REELS

for faster Production

LITTELL Automatic Centering Reels are constructed with four arms which operate all at the same time. A free loop of material is supplied to automatic feed, regardless of weight of coil.

Littell Reels are made in 100-lb. to 20,000-lb. capacities. Automatic spindle and cradle types. Plain and motor-driven. Used in thousands of plants for faster production.

Other Littell products include Roll Feeds, Dial Feeds, Magazine Feeds, Air Valves, Straighteners, Scrap Winders, Press-Vac Safety Feeders, Mechanical Pickers, etc. *REQUEST BULLETINS.*

F. J. LITTELL MACHINE CO.
4153 Ravenswood Ave., Chicago 13, Ill.

OPEN THE WAY TO GREATER PROFITS

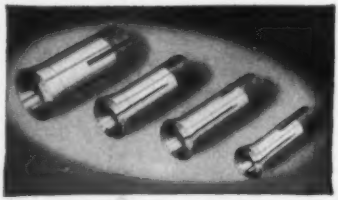
BY USING S & S HINGES

BUTTS AND CONTINUOUS LENGTHS — *for* GUARDS — CABINETS — CASES — BOXES — LUGGAGE
WRITE FOR CIRCULAR

S & S MACHINE WORKS
HARDWARE DIVISION
4539 WEST LAKE STREET CHICAGO 24, ILLINOIS

BRASS COLLETS

A new line of precision draw-in collets made of brass has been announced by the South Bend Lathe Works. Altho they are not intended to replace the more expensive hardened steel collets, they are manufactured to the same exacting tolerances and have some advantages. Their low cost makes them especially desirable



for odd sizes that are used only occasionally. However, it is said that they will give good service and can be used for short run production jobs. When worn, a brass collet can be re-bored to a larger diameter. Another advantage of brass collets is that they can also be machined for holding tapers or irregular shapes.

The brass collets are made in standard fractional sizes, 1/16" capacity up to the maximum capacity of the collet in increments of 1/64". They are also available with decimal hole sizes for any diameter between .0625" and the maximum capacity of the collet. Collets with metric hole sizes are supplied in increments of ½ mm, any size between 1.5 mm and the maximum metric collet capacity.

Designed primarily for use with South Bend Lathes, these collets are available in four styles and can be purchased for use with any machine which they will fit. For more complete information and specifications, request Bulletin No. 83 from the South Bend Lathe Works, 426 E. Madison St., South Bend 22, Indiana.

HOSE USED IN RIVETING

Rubber hose for a noiseless riveting hammer is in production at the Passaic, N. J. plant of United States Rubber Co.

The hose is said to carry hydraulic fluid under enough pressure to flatten a cold steel rivet into place with one powerful stroke. It is built of oil-resisting synthetic rubber reinforced with steel wire. It transmits pressure of several thousand pounds per square inch from generating equipment to the silent riveter.

The riveter is used in automobile factories and other manufacturing plants. It is too large and heavy for use in building construction. It is intended for use primarily where the work can be brought close to the riveter. In addition to eliminating noise it speeds up riveting operations.

The riveter looks like a huge C-clamp. It slips over the parts to be joined and holds the head of the rivet in place while the other end is flattened under tremendous pressure with one big push.

Write to Dept. BB for further information.

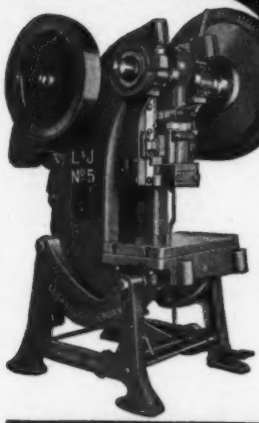
MUMMERT-DIXON SWING FRAME GRINDERS

- Standard sizes for 24", 20", 16", 14" and 12" wheels.
- For high speed wheels at 9,000 to 10,000 sfpm, or vitrified wheels at 5600 to 6000 sfpm.
- V-Belt Driven — Two speeds.
- Convenient speed change.
- No balancing weights required.

Write for Bulletin No. 3

MUMMERT-DIXON CO., 122 Philadelphia St., Hanover, Pa.

Standard Since 1911



INCLINABLE POWER PRESSES

5 to 79 tons

NO. 5 BACK GEARED TYPE

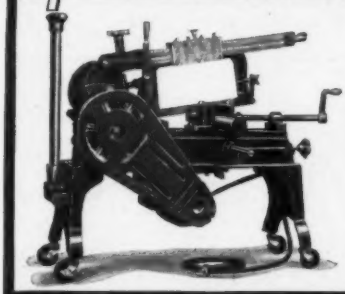
Write for catalog.

L & J PRESS CORP.
successors to Lobbouch-Jordan Tool & Machine Co.
1675 STERLING AVE. ELKHART, INDIANA

CUTTERS

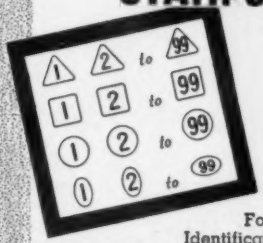
Hand Power Lever Action
for
RODS FLAT BARS ANGLES
WIRE ROPE
Send for circular.
T. H. LEWTHWAITE MACHINE CO.
311 East 47th St., New York 17, N. Y.

POWER HACK SAW



Low Priced Self-Contained
Portable Sturdy
Ready to Work—Economical
EXPORT DEPT.
1111 SO. FERRY BLD'G.
NEW YORK 4, N.Y.
Write for Bulletin No. 200
MILLER-KNUTH MFG. CO. OMAHA, NEB.

New STEEL INSPECTOR'S STAMPS



Faster Identification of Inspectors or Operators. Different borders may be used for different shifts. Available in 4 sizes. Write for prices today.

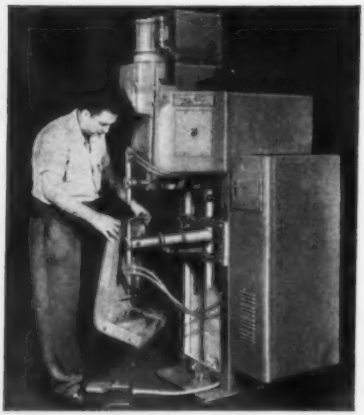
NEW METHOD STEEL STAMPS, Inc.
147 JOS. CAMPAU DETROIT 7, U.S.A.

CLOSED
TRADE AUTOM MARK
CLOSED
Plain Type
Offset Type
OPEN
OPEN
CONTINUOUS HINGES
All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.
AUTO MOULDING & MFG. CO.
1110 E. 87TH ST.
CHICAGO 19, ILL.
SPECIFICATIONS:
Open Width 3/8" to 6"
Gage Material .040 to .125
Pin Diameter .101 to 3/8
Lengths to 120"
THREE-FOURTHS OFFSET
SEMI-OFFSET

ADDITIONS TO WELDING LINE

The Taylor-Winfield Corporation, Dept. BB, Warren, Ohio announces new type ENB air operated press welders.

Two styles are available, Nos. 1 and 4.



No. 1 is either a projection welder or a combination projection and spot welder when horns are used. Style 4 is a spot welder with a swiveling lower horn. The machine shown here is the type ENB style 4 spot welder with new side mounted controls.

Among the special features pointed out by the manufacturers are:

1—Roller Anti-Friction welding head.

2—Bellows Air Lock.

3—Provision for use of side mounted electrical controls.

4—Transformer design of "damage resisting" construction.

5—Air valves mounted adjacent to air cylinders—gives low air consumption and high operating speeds.

6—Tap switches connected to transformer without flexing primary leads.

7—Composite copper-steel knee construction of Style 1 welders insures highest rigidity.

8—Rigidly supported swiveling lower horn of Style 4 welders provides maximum flexibility.

Write for new Taylor-Winfield ENB Bulletin 3-113. Contains 8 pages of useful information, specifications, descriptions and illustrations.

PLUNKET IMPROVED VISES

We make a complete line of modern vises for drill presses, shapers, milling machines and grinders. Illustration shows our standard drill press vise which may also be used on milling machines.

No. 1—6" jaws, 1½" deep, opens 5" wt. 35 lbs. $31.20
No. 2—10" jaws, 2¼" deep, opens 8½", wt. 90 lbs. $45.60

Prices are net f.o.b. Chicago. Dealers' inquiries are solicited. Write for illustrated folder today.

J. E. PLUNKET MACHINE CO.
1823 W. LAKE ST. CHICAGO 12, ILL.

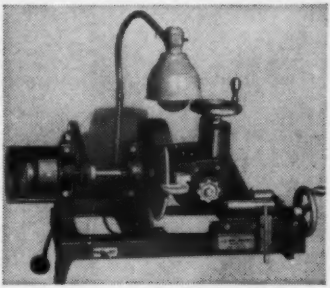
Fray "ALL-ANGLE"
MILLING ATTACHMENT

EASY TO HANDLE
FLEXIBLE
UNIVERSAL • STURDY

It is an all purpose attachment which has thoroughly proved itself all over the world. Ideal for the making of plastic molds, die casting molds, permanent mold casting molds, metal patterns, tool and die making, production work of all kinds, as well as for grinding, drilling, boring, etc.

DIRECT DRIVE OR BACK GEARED
8 SPINDLE SPEEDS 125 TO 5200
For further information write Dept. L

NATIONAL DISTRIBUTORS
H. LEACH MACHINERY CO.
387 CHARLES ST. PROVIDENCE 4, R. I.
AGENTS IN ALL PRINCIPAL CITIES



Patent Applied For

Sharpen Dull Pipe Wrenches

Industries save hundreds of dollars. Some "wrench shops" make $50 a day.

Write for information.

J. C. MOORE INDUSTRIES
P. O. BOX 234 FREDONIA, PA.

Die Filer and Saw

A versatile tool for every tool room or machine shop

Bench Model $67.50
F. O. B. St. Paul

File is fixed in its up and down stroke, assuring precision filing. Adjustable table, can be locked for precision angles. Overall arm removable for small internal filing. Use as jig saw . . . sawing plugs for die punches . . . general contour work.

MASTER PRODUCTS INDUSTRIES
79 W. Summit Ave., St. Paul 2, Minn.

NIELSEN
Heavy Duty
Live Centers

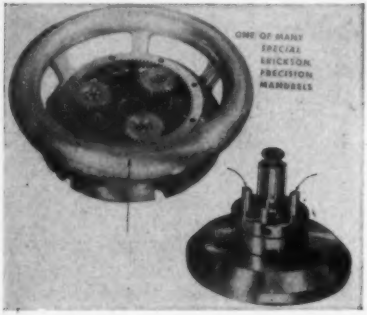
Write for catalog on live centers

Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

NIELSEN, INC. LAWTON, MICH.

CUSTOM-BUILT PRECISION EXPANDING MANDRELS

The illustration shows special features which can be incorporated in the Erickson standard mandrel line. Locating or

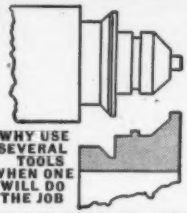


driving pins can be added, which are often interchangeable and may be of various lengths. Hand wheels can also be furnished, as can spline, hex, square or step type sleeves.

Purchasing sleeves of different sizes enables the mandrel to be used for other jobs. Very close tolerances can be held on parts to be machined. According to the manufacturer, all essential qualities of his standard line are retained, especially guaranteed accuracy of .0005", a vise-like grip on interior surfaces thruout the expansion range of 1/32", and the fact that many sizes of sleeves in increments of 1/32" can be purchased for each model of shank.

Made by Erickson Tools Division of Erickson Steel Co., 2309 Hamilton Ave., Cleveland 14, Ohio.

Automatic MULTI-TUBE SOLDERING MACHINES
★
Capillary Tubing
★
★
BUILDERS OF SPECIAL PROCESSING MACHINES
SEND PRINTS FOR SMALL LOT TUBE SOLDERING JOBS:
. . . . SMALL ORDERS OF STRAIGHT AND BENT ASSEMBLIES PROCESSED
SYRACUSE SPECIAL MACHINE CO.
122 Dickerson Street
Syracuse 2, New York

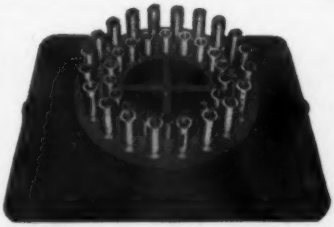


FORM GROUND CARBIDE AND HIGH SPEED TOOL BITS

TERRITORIES OPEN FOR LIVE REPRESENTATIVES

NEW MILFORD CARBIDE TOOL CO., INC.

79 NEWBRIDGE ROAD — NEW MILFORD, N. J.



Pictured: a 38-Spindle Heavy-Duty Drill Head.

DESIGNERS AND MANUFACTURERS OF MULTIPLE DRILLING EQUIPMENT

We invite your inquiry.

MICHIGAN DRILL HEAD CO.

971 E. 8 MILE ROAD — HAZEL PARK, MICH.

LUMA Soldering Tool

RESISTANCE TYPE

A proven tool for all soldering jobs large or small. Heats instantly—low maintenance. Safe to operate. Write for details.

LUMA ELECTRIC EQUIPMENT CO.

P. O. Box 132-H — TOLEDO 1, OHIO

Grobet

COMBINATION OUTSIDE and INSIDE TUBE DEBURRING FILES

From 3/16" to 2¼" O D in 16 sizes. High speed steel ground from the solid after hardening. Makes 45 chamfer outside, 30 inside. Adjustable to increase or decrease relative chamfer between inside and outside wall of tubing. Speed ranges from 50 to 250 r.p.m. according to size. Also sold in sets in special wooden box. Write for technical details. Order from your favorite supply house.

GROBET FILE CO. OF AMERICA

421 CANAL STREET — NEW YORK 13, N. Y.

MAGNETIC CHUCKS AND RELATED PRODUCTS

The O. S. Walker Company has issued a new catalog and price list covering their line of Electro Magnetic Chucks.

This line of chucks is designed to fill the need for standard and difficult holders. This company manufactures a regular line of chucks or makes special chucks to solve a specific holding problem.

Charts giving the specifications along with illustrations and recommended uses are included in the catalog.

For a copy of this catalog (WPL 47) write to O. S. Walker Co., Dept. BB, Worcester 6, Mass.

WHEEL LATHES

Two new bulletins have been issued by William Sellers and Company, Inc., Dept. BB, 1600 Hamilton St., Philadelphia 30, Pa.

These cover the new Sellers Dual Drive 90" Wheel Lathe, and the Sellers "75". These are designed to speed up the manufacture of car wheels and to insure a high degree of accuracy. The various parts, specifications, and advantageous features are shown.

Copies of these bulletins may be had upon request to the manufacturer.

FLASH WELDERS

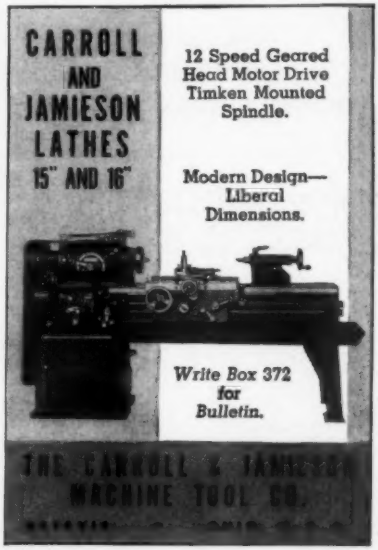
A technical bulletin (No. 204) describing its improved line of motor operated flash welders has been made available by Progressive Welder Co., Dept. BB, 3050 E. Outer Drive, Detroit 12, Mich. Construction of these machines combines both "universal" and "specially engineered" features and is designed to provide versatility of operation over a wide range of applications.

Convenience of operation and setup and outstanding performance characteristics are said to be features of these flash welding machines second in importance only to their versatility. Entire machine control is from one position; and all settings such as those for flashing voltage, amount of upset, platen travel speed, etc., can be made within a few minutes.

The bulletin lists four basic sizes having ratings at 50% duty cycle of 20, 50, 100, and 150 kva and upset forces of 2,250 lbs., 4,500 lbs., 11,500 lbs., and 19,600 lbs. respectively. The machines are also available as storage battery operated units.

The bulletin carries complete specifications, photographs of machines and detailed closeups. There is also a "phantom cut-away" sketch of a typical machine with labeled arrows locating operational features and the main working parts.

BAUMBACH
THE DIE SET AUTHORITY
SURFACE GROUND TO ASSURE PARALLELISM AND HIGH FINISH
DOWELED AFTER ALIGNMENT
All Baumbach Die-Sets have demountable Leader Pins and Bushings. This exclusive feature permits removing Leader pins for machine work on the die shoe and assures reassembly without loss of alignment. A big time and trouble saver. Write for Catalog.
E. A. BAUMBACH MFG. CO.
1810 S. KILBOURN AVE. CHICAGO 23, ILL.


CARROLL AND JAMIESON LATHES 15" AND 16"
12 Speed Geared Head Motor Drive Timken Mounted Spindle.
Modern Design— Liberal Dimensions.
Write Box 372 for Bulletin.
MACHINE TOOL CO.

Available LITERATURE

AUTOMATIC CLAMPING

The National Automatic Tool Co. Inc., announces NATCO Automatic Clamping for fixtures in connection with automatic processing machines for drilling and tapping. NATCO Automatic Power Clamping is arranged for either hydraulic or electric operation and eliminates wrenches.

A new 12-page illustrated book has just been released which shows and describes actual production with this automatic clamping. For free copy of NATCO Automatic Clamping write Department 24, National Automatic Tool Co., Richmond, Ind.

TRANSVERSE TESTING MACHINE

A catalog page describing new model Transverse Testing Machine with 10,000 pound capacity, has just been released by the Steel City Testing Machines, Inc., Dept. BB, 8843 Livernois Ave., Detroit 4, Mich. It is identified as Model TR-1.

Other types of Steel City machines include six different models of Brinell Testing machines comprising manually operated and portable types. Also a Universal model that may be adapted to tensile, traverse and compression tests up to 60,000 pounds. Write for catalog file complete—it consists of 20 pages.

CATALOG OF THERMOCOUPLES

Thermocouples, their parts, assemblies and accessories are described and illustrated in a new 16-page catalog. This has been published by the Arklay S. Richards Co., Inc., Dept. BB, 72 Winchester St., Newton Highlands 61, Mass.

This company manufactures a complete line of industrial thermocouples for all makes of pyrometers. The catalog includes specification charts, prices and recommendations for the best and most efficient use of thermocouples.

Copies may be had by writing directly to the manufacturer.

WELDABILITY OF 313 COPPER-BASE ALLOYS

A comprehensive compilation of welding and composition information relating to copper-base alloys is a set of 19 mimeographed sheets just issued by Ampco Metal, Inc., Milwaukee, Wisconsin, entitled "Weldability and Composition of 313 Copper-Base Alloys."

The list gives trade names, manufacturers and chemical composition of most of the established copper-base alloys together with such welding information as degree of weldability, preheats, type of electrodes or rods recommended and the preferred welding process.

This list was primarily prepared and issued for use by distributor welding engineers. However, Bulletin D-2383 will be sent to all interested welders and welding engineers upon request to Dept. BB.

ARC WELDING INFORMATION

Another issue in the series of "The Eutectic Welder" has been published. This Vol. 4—No. 4 announced Arc Welding at Lower Base Metal Temperatures.

Since there has been much heard of this type of welding it should prove interesting to read this article. Many advantages are claimed for this type of process. Applications and data on "Low Temp" Eutectrodes are given.

Copies may be obtained by writing to Eutectic Welding Alloys Corp., Dept. BB, 40 Worth St., New York 13, N. Y.

DIAMOND TOOL BULLETIN

"The Desmond Diamond Tool Reference Guide," a new four-page illustrated bulletin No. D-8, with full dimensional data and prices on Desmond "Tru-Set" diamond tools and nibs, has just been published by the Desmond-Stephan Mfg. Co., Urbana, Ohio. The bulletin lists diamond hand tools, diamond wheel dressers for valve grinding machines, and straight shank diamond tools and nibs. Method of listing simplifies ordering the right tool for the particular make of grinder. Pointers on the proper use of the tools is also included. Copies on request from the manufacturer.

SENTRY ELECTRIC FURNACES

Two new bulletins have been issued by the Sentry Company. One of them (No. 1054) covers "The Sentry Diamond Block Method of Atmospheric Control for Hardening High Speed Steel" and the Sentry Electric Furnaces for use with that method. The other bulletin (No. 53) describes all accessories used in applying the method.

Illustrations, descriptions, specifications and recommendations make this a handy series of bulletins to have for reference.

Copies of these bulletins may be had by writing to The Sentry Co., Dept. BB, Foxboro, Mass.

BREMIL MFG. COMPANY

1700 Pitts. Ave., Erie, Pa.

ALL-ALLOY compound lever strap cutter. Cuts 1¼ strap with one stroke.

HYDRAULIC OVERLOAD PITMAN

A bulletin has been issued which describes the Hydraulic Overload Pitman of the Dayton Rogers Company. The company maintains that by use of this devise on the punch press many failures are eliminated. Among the common failures pointed out in the bulletin are bent or broken crankshaft, broken press frame and broken tools and dies.

Important facts, specifications and the operating principle are included. A chart shows the dimensions required for installation of the pitman.

Specifications which are needed when ordering this device are given so that no time is lost when it is needed.

This bulletin may be obtained by writing to Dayton Rogers Manufacturing Co., 2849 12th Ave. So., Minneapolis 7, Minn.

LIFT TRUCKS

Lift Trucks, Inc., Dept. BB, 2425 Spring Grove Ave., Cincinnati, Ohio, announces publication of a new six page catalog devoted specifically to the Motorized HydroLectric Lift Truck.

Detailed diagrams illustrate the mechanical structure, and dimensional specifications of the HydroLectric Lift Truck.

Other pertinent facts and information concerning the HydroLectric, are contained in this publication. According to the manufacturer, interesting facts are presented showing how this versatile truck cuts operation and maintenance costs.

GRINDING AND LAPPING MACHINES

Norton Cylindrical Grinders are described in a new bulletin just issued by the Norton Company, Dept. BB, Worcester 6, Mass.

These grinders are 4" — 6" — 10" — 14" — 16" type "C". Each one is illustrated and the specifications of them are given. Illustrations are also given of the machines in action.

This company produces a wide range of grinding and lapping machines. These are designed for the tool room and for the production line.

For this bulletin, or for a condensed catalog on all Norton machines write to the manufacturers. The company also has individual catalogs for any special type of grinder or lapper.

THE FEDERAL LABOR LAWS
A Manual for Supervisors

Compiled and edited by the staff of Executive's Labor Letter. Published by National Foremen's Institute, Inc., Deep River, Conn. Approximately 85 pages. 6 x 9, spiral bound. $2.50.

With the landslide of Federal labor legislation that has arisen during the last decade, foremen have been stumped by the growing everchanging mass of legislation with which they are expected to deal.

This book attempts to clarify the relationship between Federal law and everyday problems confronting the foreman, by presenting pertinent information in such a manner that he will know how to answer questions safely.

One of the sections is devoted to the National Labor Relations Act. Under Section 7 of the Act, the employee is guaranteed the right to join, assist or form labor organizations, to bargain collectively and "to engage in concerted activities" for bargaining or other protection. Under the law, Management may not interfere with employees' rights, and the book discusses action of the foreman which might be construed as interference, such as checking on attendance at union meetings, making critical or favorable statements about a labor organization to employees, etc.

Another section discusses the Fair Labor Standards Act or the Wage and Hour Law. The provisions of this act are constantly affecting decisions made by the foreman for his company. When hiring an employee, for example, he must pay that employee a minimum of $.40 per hour. The book explains what constitutes a payment of $.40 an hour, where it must be paid, when it does not have to be paid, etc. In order to protect his company, the foreman must understand what goes to make up actual working hours—is a rest period counted?

In similar vein, the book goes on to discuss the Walsh-Healey Public Contracts Act, The Social Security Act, The United States Employment Service, The Fair Employment Practices Committee, Veterans' Rights, and Railway Legislative Acts.

This book is a readable work and thoroly practical for foremen and members of management confronted with questions relating to the rights of employees and management under government regulations.

MANAGEMENT TECHNIQUES FOR FOREMEN

By Richard W. Wetherill. National Foremen's Institute, Deep River, Conn. 177 pages. 10 x 11½, spiral bound. $7.50.

Here is a book chock full of practical advice for foremen interested in as-

similating modern managerial foremanship techniques. The material is presented in a series of well thought-out, common, every day problems with all the answers needed for the efficient discharge of foremanship duties and responsibilities.

The manual is useful to the newcomer as well as to the veteran. The newcomer will immediately receive needed information on: how to familiarize himself with all the angles of an operation before he begins, how to handle new employees, how to get along with old employees and how to ferret out discontent and avoid trouble, how to supervise women workers, a problem that has arisen in many shops since the war.

The more experienced supervisor will likewise benefit since the manual will serve as a brush-up course for him and open new routes by which he may prepare himself for better positions.

The bulk of MANAGEMENT TECHNIQUES FOR FOREMEN is devoted to employee relations, with sections on: Introducing People, Training, Managing People, Rate Problems, Labor Relations, Discipline, Leadership and Cooperation. Also discussed is the effect of the worker's attitude on Working Conditions, Safety, Quality of Work and Quantity of Work.

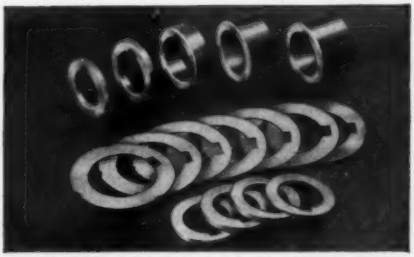
A section of the book deals with the foreman's responsibilities to himself and to his company. The last two sections are blank, so that each foreman may record information which helped solve his company's problems.

The manual should be used as a constant source of reference, for which it is admirably suited. It is a practical compendium of facts, based on many training sessions conducted by or under direction of the author.

The manual is presented in an endeavor to increase the foreman's value to himself and to his company.

PACKAGED PRECISION

MACHINISTS HAVE LEARNED TO RELY ON DE-STA-CO Arbor Spacers and Shims for milling, slitting, gang-saw set-ups and for shimming gears and bearings. De-Sta-Co long-life steel Spacers are packaged in a standard range of sizes from ⅜″ to 4″ hole diameter, up to 5½″ outside, thicknesses from .001″ to .125″, all *with keyway.* Shims are stamped and coined to commercial tolerances in the same preferred sizes, *without keyway.*



Special spacers—thicknesses greater than .125″—are also available in popular sizes, machined from bar stock, hardened and ground, with standard keyways and thickness identifications.

Handy spacer kits of 19 graduated decimal thicknesses are stocked by Mill Supply Dealers in principal industrial centers. *Order your Packaged Precision Today.*

Your De-Sta-Co Toggle Clamp Catalog No. 47 is waiting for you. *Send for it!*

DETROIT STAMPING COMPANY

347 Midland Ave. Detroit 3, Mich.

WESTERN METAL CONGRESS

The Fifth Western Metal Congress and Exposition will be held at Oakland California from March 22 thru March 27 at the Civic Auditoriums. It is sponsored by the American Society for Metals. Among cooperating technical societies are American Welding Society, American Foundrymen's Association, American Society of Tool Engineers, American Institute of Electrical Engineers. Chairman of the General Committee is E. S. Hudson, Western Forge and Tool Works, Oakland.

In addition to the technical program of the Western Metal Congress, the American Welding Society program will have special sessions of its own, as will also the American Foundrymen's Association. Heading the American Welding Society Speakers Program Committee is Edgar W. Bartz of Westinghouse Electric Corp., San Francisco, and Richard Vosbrink of Berkeley Pattern Works is chairman of the American Foundrymen's Association program.

The purpose of the Congress and Exposition will be to acquaint technical men with latest developments and techniques in their respective and related fields.

PHOTOELECTRIC FLAME FAILURE SAFEGUARD

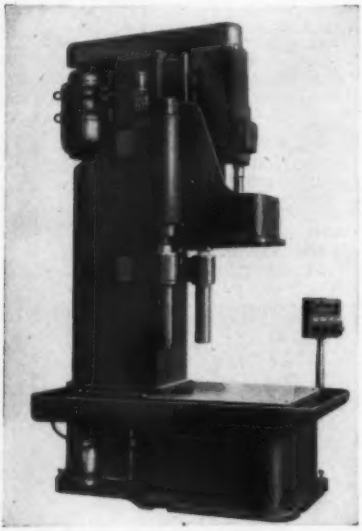
To protect against the hazard of explosion caused by flame failure in industrial oil burner installations, Combustion Control Corporation announces a new Fireye Photoelectric Flame Failure Safeguard. The instant flame fails, fumes and gases accumulate and combine with air to form a dangerous highly explosive mixture within the combustion chamber. When this condition occurs, control time is vital. Fireye Flame Failure Safeguard provides for complete protection against this danger. Fireye photoelectrically "sees" that the flame has failed and instantly turns off the fuel supply and the burner.

The photoelectric scanner is compact in design and readily installed on the burner plate either at the time of assembly of the original burner equipment or upon installation in the field. Since the scanner contains both the phototube and amplifier tube, no special shielded cable is required between the scanner and programming control. The photoelectric system is designed to withstand conditions of relatively high ambient temperature and is impervious to ambient humidity.

3 NEW DORMAN TAPPERS IN 1
INTERNAL or EXTERNAL THREADING
WRITE FOR DETAILS AND NEAREST DEALER
HAND OR MACHINE TAP
ACORN DIE
ROUND SPLIT OR BUTTON DIE
CAP. IN STEEL 2-56 TO 3/8"
MAX. LENGTH EXTERNAL THREAD 1 1/2"
FURNISHED WITH ADAPTOR OR M.T.S. FOR ALL DRILL PRESS
DORMAN MACHINE TOOL WORKS
40 S. Mac Questen Pkwy., Mt. Vernon, N.Y.

NEW DRILLING MACHINE

The Robbins Engineering Company announces a new automatic drilling machine, the Robbins No. 3 Drillmatic. This machine is designed and built as a standard machine tool specifically for special purpose adaptations at lower cost. Because the No. 3 Drillmatic is standard, the customer eliminates the high cost of designing and building the basic machine when purchasing special purpose equipment. Further, it eliminates the possibility of machine operation wrinkles to be ironed out after assembly of the tooling.



Tooling heads are mounted on the machine saddle by means of standard locating and hold-down holes. Any number of spindles may be included in the head and all are driven by the machine spindle. When operations change the head can be removed and a new one mounted.

Old-style ways are replaced by two hardened and ground alloy steel guide bars which are securely gripped in the saddle, making the saddle and bars an integral unit. The bars slide in four large, hardened and ground alloy steel bushings mounted on the machine column. Each guide bushing contains a wiper and is lubricated automatically from a central oiler. In every position of the stroke the guide bars have uniform surface engagement and rigid bearing. Due to the increased surface engagement of the bars, localized wear and costly scraping is eliminated.

The saddle is operated by a ram from the hydraulic unit mounted on the machine column above the saddle. Thus the hydraulic pressure is directly over the work, eliminating friction on the guide bars due to tool thrust and adding to the smooth operation of the machine.

The guide bushings are located on the machine column so that as the saddle feeds into the work, it approaches the bushings. Thus when the tools are cutting, the saddle is adjacent to the guide bushings and therefore has maximum support. Further, the machine column is many times oversize and is fully supported from the base assuring absolute rigidity.

The hydraulic power for the Robbins No. 3 Drillmatic is supplied from a compact, self-contained unit mounted at the top of the machine column. The hydraulic pump, pump control mechanism, oil sump and hydraulic cylinder are fully enclosed. All connections are manifolded inside the unit and there is no outside piping, valves or leaks.

The pump control is so designed that only the amount of oil required to perform the operation is supplied thru the variable delivery pump. As the resistance to the machining thrust increases, the amount of hydraulic pressure is increased in direct proportion. The spindle will not jump forward when the tools break thru the work. In addition, the saddle is fully counterweighted to produce smooth performance with less power.

A wide variety of spindle speeds is available by use of the change gears within the unit and also by changing the V-belt cone pulleys on the motor and spindle. The operating cycle can be varied to provide rapid approach, two adjustable rates of feed, dwell and rapid return, and stop.

In addition to the center tooling saddle, auxiliary units may be mounted around the base horizontally, vertically, or any angle in between. By using such auxiliary units several operations can be performed at once and with one clamping of the work. To mount these units, "wings" are welded to the base of the machine at the required position thus making the auxiliary an integral part of the machine without the high cost of special base patterns and castings.

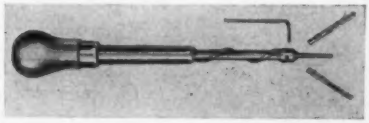
Complete details of construction and operation, specifications and dimensions, together with actual application histories of the Robbins No. 3 Drillmatic are included in a new catalog available by writing to Robbins Engineering Co., 318 Midland Ave., Detroit 3, Mich., Dept. BB.

OSCILLATOR PUSH-DRILL

A general purpose small tool is now being produced in one of the former "war plants" in Detroit, Michigan and is being sold in domestic and foreign markets by Warhan Products of 14002 Woodward Ave., Detroit 3, Mich.

It is called the "Vesco" Oscillator Push-Drill and has already found wide use in the factory and is now sold by leading hardware and tool stores, etc. The complete set consists of the holder, one ⅛ inch drill, one 3/32 inch drill and one 1/16 inch drill with an Allen wrench.

Originally designed and developed by engineers of the Murray Corporation of America as a de-burring and countersinking tool for light aircraft metals, it has been modified to provide a quick and easy means of drilling small holes in most materials except metals.



It can still be used for the original purpose by fitting any of the small rotary countersinks or de-burring tools that have a standard ⅛" shank to the holder instead of the drills supplied with it.

The tool is guaranteed by the producer who has been licensed exclusively by the Murray Corporation to manufacture and market it under a United States Patent held by this corporation.

Additional details and suggested applications for use of the tool will be gladly supplied by the Warhan organization upon request.

DRILLING AND TAPPING SERIES

Several types of drilling and tapping machines are produced by the Hamilton Tool Co., 826 S. Ninth St., Hamilton, Ohio.

In order to show the details and specifications of these machines clearly, the manufacturers have issued a series of bulletins, with each devoted to a particular machine.

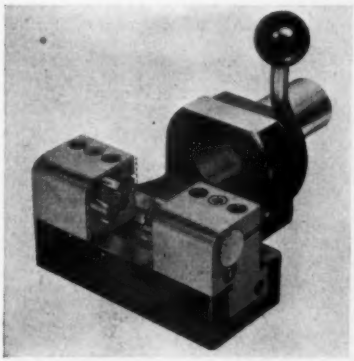
Large illustrations, charts, and lists of characteristics are included in all bulletins.

These machines are designed for production drilling and tapping of small holes. Illustrations are also included of the machines in use on a variety of jobs.

For copies of these publications write to the manufacturer. Address inquiries to Dept. BB.

RETRACTABLE KNURLING TOOL

A cam-action retractable knurling tool is announced by Universal Vise and Tool Co., Dept. BB, Parma, Mich. It is adaptable to any engine lathe or turret lathe. Outstanding advantages reported include its ability to rapidly knurl long, thin work, and to clear threads, pilots, and other sections of the same diameter as the portion to be knurled. Cam-action retracting mechanism is self-locking to free operator's hands while the tool is feeding.



Other features are instant adjustability (to any diameter up to 2"), and the formation of different knurl patterns without changing knurls. Use of standard knurls permits easy replacement.

VERSATILE MACHINE SHOP DEVICE

A wheel and tool dressing fixture has been announced by Allied Machinist of Waltham, Dept. BB, 6 Water St., Waltham Mass. This tool is designed to cut time and cost.

The manufacturers report that it will do the following jobs with great accuracy:

1—Forms any angle in addition to a number of inside and outside radii.

2—May be used to form tool bits, small dies, and thread chasers.

3—Handle drilling and light milling work.

4—When used as a surface gage, circles or chords of circles can be scribed in either vertical or horizontal planes.

4—May be used for backing off reamers and cutters.

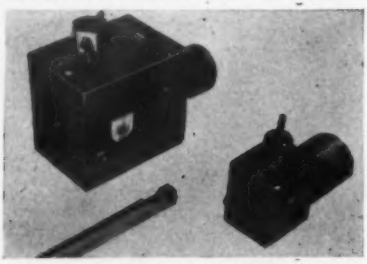
The indicator stand is very flexible.

A bulletin illustrating the device doing these various jobs may be had from the manufacturer.

BROACHING INFORMATION

Shown here are the Positive Lock Keyway Broach Puller and an assortment of various types of broaching tools which have been produced by the Acme Broach Corporation.

The Puller is for use with keyway broaches having notched shank ends. They are made in two sizes. The smaller is for use with shanks up to ¾" wide by 1" high. The larger is suitable for any notched type shank up to and including 1½" by 1½". These pullers are equipped with means for centralizing the broach shank so that shanks of varying width can be used. Both sizes have 2" — 8P thread.



A circular has been published which describes and gives the specifications of the Keyway Broach Pullers and Standard Keyway Broaches. Many advantages are claimed for these products and are included in the circular.

For more information on these products write to Acme Broach Corp., Dept. BB, E. Third St., at Delaware, Lexington 47, Ky.

HYDRAULIC ACCUMULATOR

Greer Hydraulics, Inc. announces a new design full-flow hydraulic accumulator. The unit has been tested under severe operating conditions. The manufacturer reports that the volumetric efficiency of this new design runs as high as 97% with unrestricted flow up to 50 gpm without appreciable pressure drop in systems operating at pressures as high as 3000 psi.

The accumulator makes use of a 1-piece, seamless steel shell enclosing an air bladder made of special natural or synthetic rubber depending upon the type of fluid used in the system. The bladder incorporates an integrally moulded high-pressure automotive type air valve on one end for preloading with air pressure, and an integrally moulded conical-shaped metal plug on the other end for sealing the shell at the end of the oil discharge cycle. This metal plug eliminates direct contact between the rubber bladder and the outlet plug and thus precludes possibility of bag failure due to "pick-out" of the bag from the perforated plug common with other types of accumulators.

This new unit features simplicity of design with stress laid on elimination of moving parts and oil seals which are subject to wear. The bladder serves as a permanent wall between the air chamber and the oil chamber and is claimed to make leakage between the two impossible. The bladder will withstand operating temperatures of from 200°F to minus 40°F and will retain its air discharge up to three months without attention from the operator.

For further information write to Greer Hydraulics, Inc., Dept. BB, 454 Eighteenth St., Brooklyn 15, N. Y.

AIR-HYDRAULICS ANNOUNCES LARGER MODEL

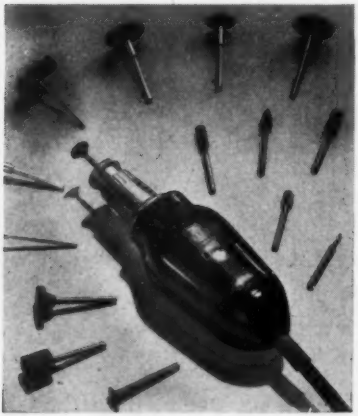
Air-Hydraulics, Inc. announces the addition of a 6-ton capacity model air hydraulic press to their present line of 2½ ton capacity models. These presses are used for assembly, riveting, embossing, staking, sizing, crimping, flanging, etc., on metals, plastics, and leathers. Air-Hydraulic Presses are stated to bring all the advantages of hydraulic press operation within the range of users of arbor presses and kick presses, who heretofore have not been able to afford switching to this new modern method. This press is offered in both bench and floor models.

The press combines the speed of air, the

smoothness and power of oil, and modern engineering to eliminate the disadvantages of wracking noises, impact shock damage, operator fatigue. The Air-Hydraulic Press may be plugged into the present airline. The 2½-ton model works on a 50 to 1 ratio on the air intake pressure; the 6-ton model on a 120 to 1 ratio. The machine is delivered ready for installation.

Ram pressure is adjustable and is controlled to predetermined specifications from delicate pressures up to 12,000 lbs. The same pressure is delivered thruout the entire length of the stroke, making possible operations that otherwise require greater power. Ram speed is adjustable from the slowest action to 300 ipm; the stroke is adjustable from 1/16" to 5". Presses can be furnished for a predetermined ram dwell or for single cycle or automatic action.

Write for the recently issued illustrated 8-page catalog to Air-Hydraulics, Inc., Dept. BB, 401 Broadway, N. Y. 13, N. Y.



USE OF TENITE

This electric power tool with housing of shockproof Tenite plastic is said to be a portable workshop in itself. It is sold with thirty-six complete accessories—abrasive wheels, drills, buffing wheels, brushes, etc.—in a metal kit large enough to accommodate other tools as well.

The plastic housing of the tool is molded in two halves and assembled over a die-cast aluminum frame which encloses the motor. Designed to fit easily in the hand, the tool is balanced for "pencil-grip" operation — meaning that motor plus lightweight Tenite housing weigh only slightly more than grip plus tool accessory. Tenite is asserted to have low heat conductivity—thus, the housing is always cool to handle. Tenite is stated to be shatterproof under heavy blows. Its finish is not marred by perspiration or oil.

The "Electri-Craft" power tool is manufactured by Casco Products Corporation, Bridgeport, Conn. Tenite is a product of Tennessee Eastman Corporation, Kingsport, Tenn.

TOOLS FOR FLEXIBLE SHAFTS

New Speedo tools, adaptable for connections to flexible shafts driven by fractional-horsepower motors, and used for filing, grinding, hammering, and similar operations in precision work, are now being manufactured by the Speedo Manufacturing Co. Inc., Dept. BB 48 W. 48th St., New York 19, N. Y.

The Filing Handpieces are gear driven and are used for filing small dies, castings, and patterns, beveling, breaking of sharp edges and corners, slotting, piercing and removing rough ridges after machining where ordinary grinders and polishing wheels are not applicable. Quick change attachments make it easy and convenient to attach the tools directly to the shaft which is held firm by ball and spring collar. The type of work mentioned is performed at speeds from 1000 to 3,000 rpm which deliver from 500 to 1500 strokes per minute. These handpieces come in a ⅛" or ¼" stroke, with two interchangeable collets which will hold a 3/32" or ⅛" shank. Special Swiss pattern machine and needle files are supplied to fit these handpieces. The Filing Handpieces weigh approximately four oz.

The hand grinder is used largely for grinding, routing, drilling, etc. Construction embodies hardened and ground shafts, precision ball bearings, and interchangeable collets which hold a 0 to ⅛" shank, with smaller collets for special purposes also available. The tool weighs approximately 3 ounces and is handled as easily as a pencil.

The Hammer is a cam driven instrument used largely for hammering, riveting, and peening delicate work. It is a light, pencil-shaped tool and weighs less than three ounces.

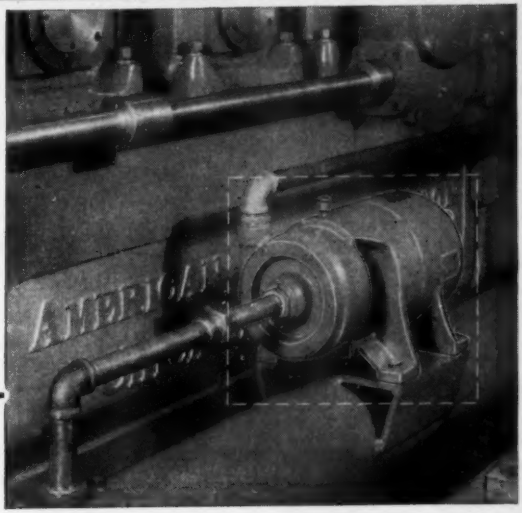
A new bulletin 46-33, mailed upon request, describes and illustrates the many features of these new Speedo tools.

Mechanics Through the Ages

SINCE
JAMES WATTS EARLY STEAM ENGINES WERE PAID FOR BY THE FUEL THEY SAVED--AND FUEL CONSUMPTION WAS FIGURED BY ENGINE STROKE COUNT-THE PATENTEES INSTALLED ON EACH OF THESE ENGINES AN AUTOMATIC COUNTER WHICH KEPT TRACK OF EACH STROKE MADE BY THE WALKING BEAM.
INDICATIVE OF THE THIN CASTS MADE BY THE ANCIENTS IS THE STATUE OF HERA WHICH, NEARLY 6 FEET HIGH, YET WEIGHS ONLY 100 POUNDS!
THE SUCCESS OF HANS REYNOLD'S BICYCLE CHAIN DRIVE DEVISED IN THE 1870'S IS SAID TO HAVE INSPIRED THE DEVELOPMENT OF THE SILENT CHAIN DRIVE FOR TRANSMISSION PURPOSES.

TRADE MARK
"FULFLO"
REG. U.S. PAT. OFF.

COOLANT PUMPS



Perfectly At Home In a Tube Mill

THE FULFLO Pump Model AG6M is mounted on a heat exchanger in a tube mill manufactured by American Electric Fusion Corporation of Chicago.

As in innumerable other plants, the pump has a "one track mind" . . . it PUMPS COOLANTS to the vital spots which must be kept cool. It does one thing but does it so well that FULFLO continues to grow in applications and installations.

Write our engineers for details of what these pumps can do in your equipment.

Standard or specially designed models.

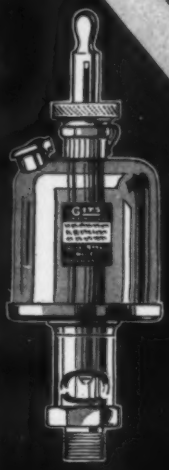
Please write on your letterhead for FULFLO MECHANICAL DATA BOOK

THE TRADE MARK FULFLO REG. U.S. PAT. OFF.

Specialties Co., Inc.

BLANCHESTER, OHIO

CONTROLLED OILING
at your fingertips



Gits Gravity Feed Oiler controls oil flow by simple turning of a knurled screw. Flow can be shut off completely during idle periods. The transparent reservoir shows quantity of oil present, and rate of flow may be viewed at all times through a sight glass in the shank. Available in several models, Gits Gravity Feed Oilers are especially adapted to high vibration operations. Sizes, models, prices on request.

Write for the Wealth of Lubricating Information in Gits Catalog No. 60.

GITS BROS. MFG. CO.

1860 South Kilbourn Avenue — Chicago 23, Illinois

Exclusive for over 35 years

PERSONNEL MEETING

The National Association of Personnel Directors, Chicago, Illinois, will hold a three-day conference at the Waldorf-Astoria Hotel in New York City on March 24, 25, and 26, 1947. Chairman of the Conference will be Robert T. Collins, Director of Industrial Relations for the New Departure Division of General Motors Corporation. Those in attendance will include personnel directors,. directors of industrial relations and other executives charged with the responsibility of human engineering in both industry and service organizations.

The National Association of Personnel Directors is an association dedicated to the work of assisting in the development and improvement of personnel directors; to raising the standards and promoting the appreciation of the profession; and to creating unity and cooperation among all members of management.

The conference theme will be "Personnel Director, the Key to Industrial Peace," and it is expected that about 1000 executives from large and small organizations will attend.

In addition to speeches on such subjects as Personnel in Distribution, Making Human Relations Pay, Collective Bargaining among Office Workers, there will be two panel sessions on Portal to Portal Pay Demands and New Developments in Testing, Selecting, Training and Orientation, as well as an open forum and several other panel sessions.

The Honorable William O'Dwyer, Mayor of New York City, will open the conference. Present will be James Farley, former Postmaster General, former Senator Wagner, James Roosevelt, son of the late President, and the Honorable Lloyd B. Roulet, Mayor of Toledo, who has become well known as the "Father of the Toledo Plan," which has done so much to create a better understanding between management and labor and which is in operation in the City of Toledo as well as being under consideration in several other large cities.

The conference is open to all who are interested.

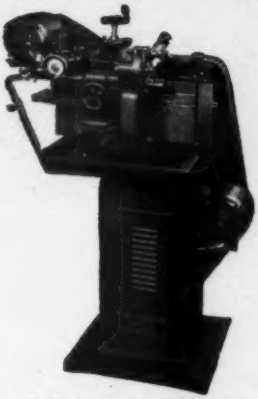
. . . office boy can grind precision flutes with 50F

Especially designed for automatically fluting, taps, reamers, drills, milling cutters

- ★ Grinds flutes in small taps and reamers from solid
- ★ Regrinds milling cutters
- ★ Regrinds angular cutters
- ★ Sharpens small saws in gangs up to 3¾" long

Wide range of special applications

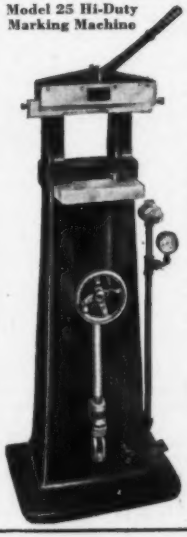
Write for Bulletin 50F.



Fully Automatic Universal Flute Grinder

THE **WARDWELL** MANUFACTURING CO.
3165 Fulton Road, Cleveland 9, Ohio

Model 25 Hi-Duty Marking Machine



MARK YOUR PARTS

Permanently

PART NUMBERS — CATALOG NUMBERS
HEAT NUMBERS — SERIAL NUMBERS
PATENT NUMBERS
MANUFACTURER — INSTRUCTION DATA — INSPECTION

Positive, Permanent marking on your products assist prospects to order. Makes it easier to buy—new, repeats and repairs. Gives you a definite record of pertinent data on each part produced.

The Pneumatic marking machine illustrated is our HI-DUTY model 25 general purpose tool for short runs or production work. It operates from your shop air line and is one of numerous models built to produce neat, permanent markings quickly on metal fabrications.

We will be happy to make specific recommendations upon receipt of samples or prints of parts to be marked, showing approximate lettering, its location on the part, with required hourly production.

MARKED PARTS ADVERTISE
IN THE RIGHT PLACE, AT THE RIGHT TIME

Send for complete catalog of our full line of marking Tools, Machinery and Equipment.

GEO. T. SCHMIDT, Inc.

1802 W. Belle Plaine Ave. Chicago 13, Ill.

Speed Press Work

with FEDERAL DIAL FEEDS

Federal Dial Feed Presses produce scores of items which formerly required special machinery of limited utility—and increase production as much as 3 to 6 times besides! Dials are easily indexed to any part of the crankshaft revolution, from 90 to 120 degrees, and have positive-locking mechanism. Automatic loading and ejecting mechanisms can be used to increase speed further. Write for catalog of complete Federal Press line.

Available in 8 sizes—capacity, 6 to 80 tons.

THE FEDERAL PRESS CO.

447 Division St., Elkhart, Ind.—Telephone 2831

R. E. M. A. PLANS CONVENTION

Pittsburgh, Penna.—A permanent, far-reaching policy of national refrigeration and air conditioning expositions, centering around the holding of one all-industry show every two years beginning in January 1948, was announced today by the Refrigeration Equipment Manufacturers Association.

The program was voted unanimously by directors of the association following an analysis of the results of the Fourth All-Industry Refrigeration and Air Conditioning Exposition in Cleveland last fall which was three times larger in size and attendance than any other comparable event in the industry's history.

Inaugurating the new policy will be the Fifth All-Industry Exposition, which will be held in the Cleveland Public Auditorium, January 26, 27, 28 and 29, 1948, under the sole sponsorship of REMA. Thereafter, REMA will sponsor exhibitions every two years, an event already having been scheduled for January, 1950.

Representing 104 manufacturers who are members of REMA, and taking into full consideration reports from the 208 exhibitors in the Fourth All-Industry show, the REMA directors decided on the biennial exposition program as one which will enable the industry to display its products to the greatest effectiveness and with the benefit of careful, long-range planning. It was felt that the two-year policy not only will keep the industry's expositions from the class of "just another show" but will result in each exposition being truly representative of the industry in all its segments.

Expanding its previous policy, the Fifth and subsequent all-industry shows are being planned as events of importance to dealers, equipment distributors and contractors as well as to wholesalers, service engineers and others engaged in all branches of the industry. Show features will be planned to interest all members of the industry—designing, manufacturing, selling, installing and servicing.

BRAECKER

FILING AND SAWING MACHINE

FOR TOOL AND DIE MAKERS

MAVEG INC.

Machines Sales Association

299 Broadway New York 7

Tel. Whitehall 4-3455

MILLING - DRILLING - BORING ATTACHMENT for Heavy Duty Operations

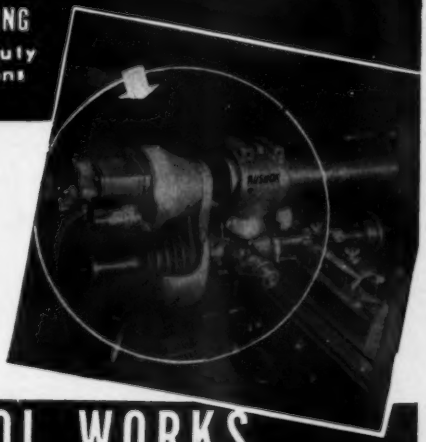


Photo shows a special operation not suited to standard straddle mill set up but easily handled by means of a RUSNOK Milling attachment used horizontally on a standard milling machine, saving one machining operation and accomplishing greater accuracy in finished piece parts. Uses many types of cutters on a wide range of work. Easily mounted—tilts to any angle. Large size spindle (No. 9 B & S taper). Takes ⅛" to ¾" end mills. Large quill with 4" travel, counter balanced, hardened and ground. Six speeds 250 to 3000 RPM. Lever and worm feeds. ½ h.p. motor. Specially engineered by RUSNOK to meet modern demands for high speed, high precision, heavy duty end mill operations.

Prompt delivery.

Write for illustrated circular and prices.

RUSNOK TOOL WORKS

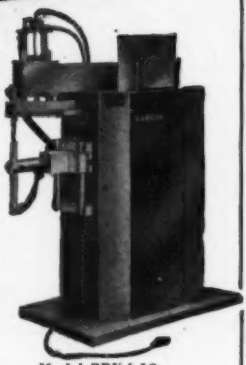
4840 WEST NORTH AVE. CHICAGO 39, ILL.

Get BETTER Welds
Get FASTER Welds

with **LARKIN**

Instant Control

Here's a spot welder with a solenoid-operated air-cylinder which gives you *instant action . . . positive control . . . and the fastest work obtainable.* When you step on the electric foot switch, solenoid closes, and downward stroke instantly starts. When foot switch is released, solenoid opens, and air raises press head. Downward stroke is definitely aligned by dual plungers—prevents skidding between tips. Accommodates all types of work, especially projections. *Weld with a Larkin, and do a sound, fast, low-cost welding job.* 75 K.V.A. Other models from 5 to 250 K.V.A.



Model PRYA 12
75 K.V.A.

Larkin ARC-WELDERS save money, too!

Larkin heavy-duty arc-welders have a record for fast, strong welds at lower wattage. Known for steady voltage . . . smooth flow . . . better control . . . wide range . . . easy arc . . . uniform welds at all heats. Sizes from 75 to 500 amperes.

There's a Larkin Welder for every purpose — *arc, spot, projection and butt.*

Some Territories are Still Available to Distributors

Send for Prices and Full Details Now To

LARKIN LECTRO PRODUCTS CORP.
156 W. 146th Street, New York 30, N. Y.

NEW RESIN FOR GASKETS

Pittsburgh, Pa., Feb. 5— The successful use of "Teflon" tetrafluoroethylene resin, a new Du Pont plastic, for gaskets on lines carrying nitrating acids and as a primary installation for armature conductors on traction motors, was reported here tonight by Everett B. Yelton, technical service engineer of the DuPont Plastics Department. Mr. Yelton spoke before a meeting of the Society of Plastics Engineers in Mellon Institute Auditorium.

A service life of at least one year on the acid lines has been attained with gaskets of "Teflon", the speaker reported, and in every case failure was mechanical rather than chemical in nature. The normal service life of gaskets of other materials is one to two weeks.

Thin tapes of the unique plastic permit the operation of a motor at higher temperatures and with higher efficiencies than are practicable with present insulating materials, Mr. Yelton said. Preliminary tests have indicated also that a motor insulated with "Teflon" should have a longer life before rewinding becomes necessary.

Mr. Yelton told the plastics group that "the excellent electrical properties of 'Teflon', coupled with its stability under heat, give it many potential applications in the power field, where one of the limiting features in the design of electrical equipment has been the lack of a suitable insulating material that will withstand high temperatures."

The Du Pont plastic is unharmed by temperatures up to 575°F and withstands every known solvent, Mr. Yelton said. It has an extremely low dielectric loss factor, even at frequencies up to 3,000 megacycles.

The plastic is being produced on a semi-works basis in a variety of forms and converted by machining and molding into finished articles. Mr. Yelton predicted that volume production, planned within the next two years, would result in reduced costs, and that initial fabrication difficulties would be overcome thru the development of new techniques.

THE NEW DEARBORN MODEL "E" CHUCKING AND INDEXING FIXTURES

FOR MILLING MACHINES AND DRILL PRESSES

Dearborn fixtures meet every demand for automatic chucking and indexing, permitting several operations on the same piece with only one setting.

Model E is both a degree and a ratchet indexing fixture. It may be changed from one to the other in less than a minute. It will index any number of degrees or any fraction of a degree. Two adjustable stops are provided so that two angles can be obtained if necessary.

Work is held by collets which take up to and including 1" round, 7/8" hexagon and 3/4" square. Other shapes can be held with special collets.

Let us send bulletin giving full information.

J. W. DEARBORN

ANSONIA, CONN., U. S. A.

If you have a SPECIAL PROBLEM

in any of these operations, where precision work is demanded and where greater production at man-hour savings is paramount—

• BORING—rough, semi-finish and finish • MILLING (special types) • STRAIGHT LINE DRILLING • UNIVERSAL ADJUSTABLE SPINDLE DRILLING • HONING • TAPPING • REAMING • COUNTERBORING • VERTICAL AND WAY-TYPE EQUIPMENT

then a Moline Multiple Spindle Specially Designed machine tool is your answer. Moline tools are ruggedly built and engineered to fit your PARTICULAR requirements, they're made to last for years, they're easy to change over to other jobs, they do better work at less cost and stand up to it longer.

For YOUR special problem, go "HOLE-HOG," write us for any information you may need.

MOLINE TOOL COMPANY

100 20th Street Moline, Illinois

NOW! HEXAGON AND SQUARE

Precision Collets

24 HOUR DELIVERY!

FOR ATLAS • LOGAN • SOUTH BEND
SHELDON • HARDINGE • CLAUSING
ELGIN • CRAFTSMAN LATHES, ETC.
BROWN & SHARPE MACHINES AND
MANY COLLET CHUCK ATTACHMENTS

HEX OR SQUARE Collets needed for that new job? Then say "PRECISION Collets, please!" to your industrial distributor. You'll get them now when you want them . . . from stock. And you'll get them as you want them . . . ground dead true, with a spring temper that spells assured performance, and with long life guaranteed.

PRECISION Collets fitting most popular machines and attachments are stocked in ROUND, HEXAGON and SQUARE sizes. Order them from leading distributors thruout the country, who serve industry well.

Our new catalog of PRECISION Collets and Lathe Attachments is ready — Write for it!

KASSON ENTERPRISE

GENERAL DIE AND STAMPING COMPANY
262-272 MOTT STREET • NEW YORK 12, N. Y.

This 24% rise in shipments indicates a good increase in actual volume, the association points out, since reports from all over the country show that the general price levels on tool and die work fall short of reflecting increases in costs, and have changed but little since V-J Day.

"This means that manufacturers of metal and plastic articles are banking on tooling up more intensively to cut their labor costs," said George S. Eaton, Executive Secretary of the tool and die organization. "It also means that the approach of keener competition is causing some of them to go ahead with preparations to bring out really new postwar models, in spite of all the labor and material uncertainties that plague the country."

Reflecting the usual year-end quietness, orders received in December, as reported to the association, showed a 15% decline from the November level.

Because of the trend toward more elaborate tooling as a means of lowering production costs, Mr. Eaton looks for a gradual rise in tool shop operations. However, he points out that the volume of special tooling is an excellent barometer of future business, as tooling orders must precede by some months the time when a factory can begin to turn out any new model. And if a serious recession is in prospect, he says that the output of dies and tools cannot be expected to continue its recent increase.

MACHINE TOOL ACCESSORIES SHIPMENTS UP IN 1946

The dollar value of dies, tools, molds and other special tooling shipped during the last two months of 1946 ran nearly one-fourth above that of the same period in 1945, according to figures just released by the National Tool & Die Manufacturers Association. This covers the specially designed equipment used in "tooling up" standard machinery to produce new models. December shipments were the highest of any month of the fourth quarter.

MILL IT
ON YOUR LATHE

WITH A **PALMGREN**

MILLING ATTACHMENT

No. 250

NOW—you can do milling, slotting, grinding, grooving, squaring shafts, sawing at angles, and many other important operations on your lathe. PALMGREN MILLING ATTACHMENT is a necessary fixture for small shops, schools and emergency work in large plants. Fits South Bend, Atlas, Craftsman, Logan, Sheldon and all other makes. It has graduation for rotary angle adjustments, also graduated feed and adjustment screw. Easily mounted by straddling lathe's regular tool post. Try one—it will quickly pay for itself.

IMMEDIATE DELIVERY

Nos.	Width Jaws	Depth Jaws	Jaws Open	Weight Pounds	Base Opening	Price F.O.B. Factory
150	1½"	1"	1⅛"	6½	1"	$18.75
250	2½"	1 7/16"	2½"	11	1¼"	24.75
400	4"	1½"	4"	25	2"	39.75

Order from your dealer or jobber. Write for circular No. 350.

CHICAGO TOOL AND ENGINEERING CO.

Mfrs. of PALMGREN PRODUCTS for over 29 Years

8384 South Chicago Avenue • Chicago 17, Illinois

Spiral
PRECISION TOOLS . . .

Make your tooling problem ours. We are equipped to make cutting tools of all kinds to YOUR SPECIFICATIONS, or our engineers will design the proper tools to do your job.
YOU CAN BANK ON OUR DELIVERY PROMISE. We make Eccentric Relief Cutting Tools, Carboloy-Tipped Cutting Tools, Step Drills, Step Reamers, etc. Tolerances are maintained exactly. Send us your sketch or blue print for quotation.
If it is a Cutting Tool We Make It.

SPIRAL MANUFACTURING CORP.

3612 NO. KILBOURN AVE. CHICAGO 41, ILLINOIS

Pratt Grinding Gauges caliper external cylindrical jobs while work is in motion or at rest. Adapted to straight or tapered work. Tolerances of .0001" plus or minus easily maintained. Visible check on out of roundness, rough grinding and chatter. Cannot grind work undersize unknowingly. Easily installed on any grinder. Pratt Grinding Gauges increase production, eliminate scrap and assure accuracy. A modern precision tool, ruggedly built.

Send for Bulletin

American
DIAMOND TOOL & GAUGE CO.
15920 WOODINGHAM • DETROIT 21, MICH.

SPEAKERS ANNOUNCED FOR DALLAS A.S.T.E. SHOW

Technical sessions scheduled to be held coincident to the Fifteenth Annual Convention of the American Society of Tool Engineers, March 19-22, at Houston, Texas, show promise of being an outstanding technical seminar.

"Crushed and Diamond Dressing of Grinding Wheels" is the subject for the first technical session of the Convention, to be held Wednesday afternoon, March 19. F. J. Tone, Jr. will keynote this seminar.

E. V. Flanders of Jones & Lamson Machine Co. will round out the symposium with a presentation on applications of the processes.

"Incentive and Enterprise", described as a tonic for ailing industry, will be the topic of James F. Lincoln at the Wednesday evening seminar.

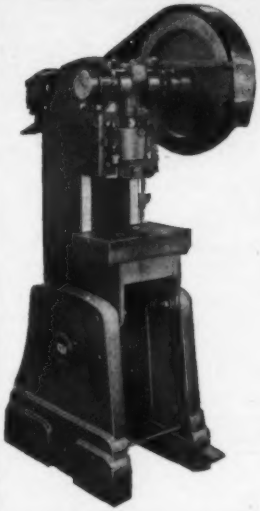
"The Tool Engineer Looks at Oil" will be the subject of Thursday morning's session. The keynote for this subject, new to A. S. T. E. audiences but familiar to men of the oil country, will be sounded by Harry C. Weiss, President Humble Oil & Refining Co.

"Magnesium and Plastics," is scheduled for discussion Thursday afternoon. A. P. Beutel, Vice-President and General Manager of the Texas Division of Dow Chemical Company is slated to deliver the principal address.

"Professional Tool Engineering", the Thursday evening symposium, will be conducted by Otto W. Winter, the A. S. T. E. National Educational Chairman.

"Super Precision Instrument Manufacture" will be of special interest to Friday morning's technical audience. Col. E. E. Drake, President of Gulf Research Development Company, will speak.

"Unusual Carbide Applications", the topic of Friday afternoon's symposium, will feature an address by Noah Dietrich, Vice President, Hughes Tool Company, Houston, Texas. Philip McKenna, President, Kennametal, Inc., Latrobe, Pa., will discuss various phases of the machining of hard surfaces.



THE U. S. 12 TON O.B.I. PUNCH PRESS

★ ALL STEEL FRAME
★ HEAVY CONSTRUCTION
★ ALL BRONZE BEARINGS
★ AMPLE DIE SPACE
★ MODERN DESIGN

WRITE US FOR FULL DETAILS & PRICE LIST

PROMPT DELIVERY

PROFITABLE TERRITORIES OPEN

U. S. PRESS and TOOL CORP.
6456 NORTH HAMLIN AVE.
CHICAGO 45, ILLINOIS

MULTI - STEP
COUNTERBORE
Carbide Tipped
To Your Specifications

•

WRITE
FOR
FOLDER

We manufacture tools to meet your most exacting requirements. Personal attention — competitive prices.

Send us your prints for quotations.

CARBIDE TOOL COMPANY
956 HARPER, DETROIT 11, MICH.

SEE BETTER
with a
MAGNI-FOCUSER

The Best Eye Aid for
- LATHE WORK
- BENCH WORK
- SAW FILING
- REWINDING MOTORS
- TOOL AND DIE WORK

Pat. U.S.A.

EVERYONE in your plant who does precision work can do it **easier, faster** and **better** by wearing a Magni-Focuser. This **binocular** eye-loop enables you to **see** an object **sharply magnified** with the comfort and clarity of normal vision. Relieves eye-strain—lessens fatigue—reduces accidents. **Allows free use of both hands.** Available in different magnifications, from 2¼ at $8.50 to 3½ at $10.50. If your distributor cannot supply you, order direct. Money refunded if Magni-Focuser does not help you see better.

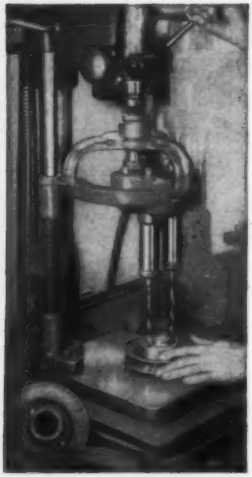
EDROY PRODUCTS CO.
478 Lexington Ave., New York 17, N. Y.

LINDERME

USERS SAY:

Production UP . . .

Costs DOWN!



2 HOLES • 1 STROKE

THAT'S SIMPLE ARITHMETIC with a LINDERME Two Spindle Adjustable Drill Head on the job. Here's a drill head *low* in price, *high* in productivity. Its versatility makes it a gold mine. Linderme Drill Head users in general and production machine shops, plastics fabricators and others report great savings from a low initial investment . . . It's quickly set to variable centers from ½ to 6", drill capacity up to ⅛", adaptable to various tapping units. Models A and B for sleeve adaptation to drill press quills; Models C and D with "over arm" arrangement, mounted on heavy ground base for use with drill fixtures. *Write for Bulletin.*

LINDERME MACHINE AND TOOL CO., INC.

12253 COYLE AVE. • DETROIT 27, MICH.

PRESS BRAKES

We have come a long way since the smaller press brakes used in sheet metal shops for making angular and other formative bends in sheet metal went into use. Press brakes of the present day include some very large machines, capable of bending relatively heavy plate. Not all of these are of the regulation type. Some have been observed that are of open-ended type, the top bending die being held on an extended arm, so that boxes, trunks and rectangular tanks with high sides can be formed, from one sheet of metal, in such manner as to encircle the extended arm. After being fully formed, they can be readily taken off, over the open end of the arm, without distortion. This type of machine is made in many sizes. It will also form chutes and troughs of all kinds, perfect tubes and pipe, either straight or tapered, in addition to a wide range of other work to which the press brake is usually well adapted.

With particular regard to the production of tapered tubing, or other tapered and curved items such as sections of cones, the obvious way to produce them is to figure out the proper amount of taper, and incorporate it into the dies used in the machine. However, where relatively moderate amounts of such work are to be produced, it will not pay to go to the expense of making special dies. Instead, the taper can be produced by laying out evenly-spaced elemental lines on the cone or tube material, to use as contact lines for the bending dies. Then, by using standard dies, but setting one end of the male die higher than the other, so one end of the die enters into the female die less than the other, one end of the material will be bent less than the other, or to a larger radius, at each stroke of the press ram. Incidentally, one very fine line of press brakes incorporates what is termed a ram-tapering mechanism, to facilitate such work. Either end of the press ram can be tapered as much as ¼" per foot.

Universal's

NEW DRILL PRESS TAPPING ATTACHMENT

FOR ALL STANDARD MAKE DRILL PRESSES

High Speed Tapping No. 8 to ½" in Brass. No. 8 to ⅜" in Cast Iron and No. 8 to 5/16" in Steel.

Write for full particulars today

UNIVERSAL ENGINEERING COMPANY OF SAN DIEGO, CALIFORNIA

GUN DRILLS

FOR DEEP-HOLE DRILLING WITH H.S.S. OR CARBOLOY TIPS. INQUIRIES SHOULD STATE DIAMETER, OVER-ALL LENGTH, SIZE AND STYLE OF ADAPTOR.

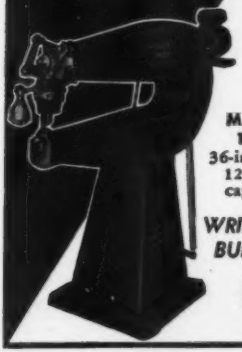
CONNER

TOOL & CUTTER COMPANY

1000 East McNichols Road
Detroit 3, Michigan

Libert Hi-Speed SHEAR

CIRCLE CUTTING ATTACHMENT Included as STANDARD EQUIPMENT with this Machine



MODEL 1236
36-in. throat.
12-gauge capacity.

WRITE FOR BULLETIN

SIMPLIFIES Maintenance
SPEEDS Production
SAVES Manpower

In wartime work, the *Libert* has amply proved its advantages by turning out top production—shearing flat or formed sheet metal, internal or external, plain or irregular shapes *rapidly, accurately, cleanly!*

Equally effective in maintenance work, *Libert* is cutting costs to rock bottom. Edges are smooth, need no finishing. Unskilled operators produce accurate work at once.

Sizes up to 60-in. throat, 10-gauge capacity.

LIBERT MACHINE COMPANY

Green Bay, Wisconsin

YOU'LL FIND IT HERE!

PRODUCTS ADVERTISED IN THIS ISSUE

Abrasive Cloth, Paper, Disc, Belts, Wheels, Stones, Etc., 32B-C, 38, 46, 114, 132, 133, 237, 256
Abrasive Wheels, Rubber, 237
Accessories, Portable Tool, 194-195
Air Compressors, 20
Air-Operated Equipment (Look for specific item)
Angle Irons, 292
Angles, 319, Back Cover
Arbor Spacers, 354

Balancing Machines, 11, 210, 227
Balancing Ways, 249
Bearings, 377
Bearings, Oilless, 197
Bearings, Roller, 70
Bearings, Spherical, 70
Belt Hooks, 285
Belt Lacers, 285
Bending Equipment, 30
Blades, Band Saw, 68, 215
Blades, Hack Saw, 16, 59, 85, 215
Borescopes, 212
Boring, Drilling and Milling Attachments, 365, 367
Boring, Drilling and Milling Machines, 19, 61, 211
Boring Heads, 99
Brakes, Apron, 262
Broaches, 117, 156
Burs, 169, 306, 329
Bushings, Drill Jig, 161, 184, 202, 218, 257

Carbide Tipped Tools, 4, 101, 300
Carbide Tool Grinders, 239
Carbides and Special Cutting Tools, 91, 101, 149, 171, 306, 332, 349
Centers, Lathe, 300, 381
Centers, Live, 21, 62, 110, 347
Chucking and Indexing Fixtures, 367
Chucks, Air-Operated, 52
Chucks, Collet, 15, 52, 76, 109, 340
Chucks, Diaphragm, 171, 337
Chucks, Drill, 325
Chucks, Lathe, 82
Chucks, Magnetic, 82
Chucks, Wrenchless, 267
Clamps, 4
Clamps, Air, 164
Clamps, Toggle, 32D, 254
Clutches, 20, 217, 242, 251
Coating Equipment, 238
Collets, 15, 109, 368
Comparators, 191, 307
Coolant Systems, 100
Counterbores, 96, 126, 183, 282, 371
Counterboring Tools, 54
Counting Machines, 323
Couplings, Flexible, 220
Couplings, Torque Control, 221
Cut-Off Machines, 87, 388
Cutters, De-burring, 322
Cutters, Milling, 14, 90, 109, 126, 199, 326
Cutters, Strap, 352
Cutting Machines, 99
Cutting Tools, 12
Cylinders, Hydraulic and Pneumatic, 18, 76, 111, 155

Demagnetizers, 82, 273
Dial Indicators, 141, 145
Diamond Powder, 298, 318
Diamond Wheels, 298
Diamonds and Diamond Tools, 298, 320
Die Heads, 191
Die Heads, Threading, 109, 191
Die Holders, 86
Die Filers, 31, 347
Diemakers' Supplies, 311
Die Making Machines, 31, 269, 280, 365
Die Polishing Machines, 70
Die Sets, 34, 55, 65, 350
Die Springs, 32D
Dies, 314
Dies, Forming, 203
Dividing Heads, 82
Dowel Pins, 32D, 335
Dressers, Diamond Wheel, 330
Drill Sleeves, 391
Drill Heads, 189, 336, 328, 349, 372
Drill Jigs, 108, 344
Drilling and Tapping Units, 26, 328
Drilling Machines, Multiple Operation, 213
Drilling Machines, Multiple Spindle, 17, 118
Drilling Machines, Radial, 87
Drilling Machines, Vertical, 44
Drills, Center, Core, Twist, Square, etc., 12, 63, 156, 183, 380
Drills, Gun, 373
Drills, Portable Electric, 127
Drives, Motor, 48, 73, 157, 335
Drives, Punch Press, 23
Dust Control Equipment, 42, 124, 228, 388
Dyes, Layout, 291

End Mills, 126, 183
Eye Bolts, 4

Facing Machines, 183
Feeders, Safety, 343
Files, 83, 147
Files, Rotary, 15, 32D, 159, 281, 306
Files, Tube Deburring, 349
Flexible Shaft Equipment, 15, 87, 127, 143, 185, 232, 269, 290
Form Tools, Circular, 126
Forming Machines, 161
Furnaces, Heat Treating, 112, 258, 375, 383

Gages, 24, 126, 218, 326, 333, 370
Gages, Pin, 74
Gages, Plug, 30, 176, 233
Gages, Thread Ring, 171
Gear Checking Instruments, 13
Gear Shapers, 123
Grinders, Abrasive Belt, 312
Grinders, Air, 324, 339
Grinders, Automatic, 46
Grinders, Bench, 127, 160, 388
Grinders, Carbide Tool, 239
Grinders, Centerless, 6-7
Grinders, Drill, 31
Grinders, External or Internal, 89
Grinders, Flute, 363
Grinders, Pedestal, 48, 127, 388
Grinders, Portable Electric, 339
Grinders, Precision, 2
Grinders, Profile, 331
Grinders, Surface, 33, 66, 84, 120, 225, 316, 341
Grinders, Swing Frame, 344
Grinders, Thread, 191
Grinders, Tool Post, 388
Grinders, Tool and Cutter, 31
Grinders, Tool Room, Inside Back Cover
Grinding Wheel Dressers, 277
Grinding Wheels, 194-195

For Straight Hardening

LONG, SLENDER HIGH-SPEED STEEL TOOLS, SPINDLES, BROACHES, REAMERS, ETC.

SENTRY MODEL "YP" VERTICAL FURNACE

SENTRY

MODEL YP

VERTICAL

ELECTRIC FURNACES

Large or long, slender high-speed steel tools, broaches, spindles, etc. are best hardened in the specially designed Sentry Model YP Vertical Electric Furnace. Employs the Sentry Diamond Block Method of Atmospheric Control for maximum quality hardening of molybdenum, tungsten or cobalt high-speed steels. No scale or decarburization.

Finished work is smooth, dimensionally correct and true to shape, saving costly finishing operations.

Sentry Electric Furnaces are made in sizes and capacities to meet your requirements.

You'll be interested in our latest catalog. Ask for bulletin ***YP-DL***

Sentry — Always on Duty

The Sentry Company

FOXBORO, MASS., U. S. A.

Sentry DIAMOND Block

Grooving Tools, 301
Guards, Machine, 182
Guides, Saw, 236
Guides, Tap, 162

Hammers, 241
Hammers, Portable Electric, 75, 186
Heads, Boring, 259
Heads, Dividing, 343
Heads, Multiple, 125
Heads, Tapping, 113
Hinges, 343, 346
Holders, Knurl, 250
Holders, Tap, 113
Holders, Tool, 4, 21, 121, 165, 219
Honing Machines, 72
Hydraulic Equipment (Look for specific item)

Indicators, 326
Indicators, Dial, 145

Jaws, Vise, 251
Jig Borers, 95
Jig Boring & Milling Machines, 95
Jig Boxes, 223
Jigs, Clamping, 171
Joints, Universal, 41

Keyseaters, 151, 288
Knurling Attachment, 342

Lapping Machine, Centerless, 30
Lathes, Automatic, 71, 104, 219
Lathes, Bench, 56-57, 259
Lathes, Engine and Toolroom, 64, 350
Lathes, Polishing, 27, 87, 273, 388
Lathes, Precision, 3, 130, 241
Lathes, Production, 198
Lathes, Turret, 11, 32A, 115, 128, 196
Layout Materials, 276, 304
Lift Trucks, 234
Lighting Equipment, 98, 334
Locaters, Optical, 202
Lubricants, 8, 362
Lubricating Devices, 75

Magnetic Blocks, 289
Magnifocuser, 371
Magni-Sines, Back Cover
Maintenance Materials, 214
Mandrels, 93
Marking Machines, 167, 363
Measuring Equipment, 319
Metal, Mechanite, 96
Micrometers, 145, 186, 209
Milling and Jig Boring Machine, 235
Milling Machine Attachments, 303, 347, 369
Milling Machines, Automatic, 27, 271
Milling Machines, Bench, 49, 56-57, 259
Milling Machines, Hand, 247
Milling Machines, Horizontal, 229
Milling Machines, Knee Type, 303
Milling Machines, Vertical, 61, 378
Mills, Hollow, 54, 289
Motors, 48, 87, 196, 241

Oilers, 362

Parallels, 289, 319
Planers, 36-37
Plates, Surface, 156, 200, 319
Polishing Machines, 32, 127
Press Brake, 39, 77
Presses, Arbor, 81, 284
Presses, Automatic, 385
Presses, Dial Feed, 364
Presses, Drill, 9, 27, 87, 305
Presses, Foot, 193, 313, 314, 345
Presses, Name Plate, 286
Presses, Punch, 195, 187, 266, 295, 371
Projector, Optical, 247
Protractors, 145
Pullers, 65
Pumps, 107, 156
Pumps, Coolant and Lubricant, 276, 361
Pumps, Hydraulic, 99
Pumps, Vacuum, 20
Punch & Die Filing, 237
Punches, 314, 335
Pyrometers, 337

Radii & Angle Dressers, 116, 279, 333
Reamers, 126, 156, 183, 379
Reamer Drivers, 287
Rectifiers, 88
Reels, 343
Reel Stands, 122
Retaining Rings, 29
Rivet Setters, 60
Riveters, 111, 280
Riveting Machines, 60
Roll Feeds, 122
Roll Forming Machines, 325
Routers, 388

Sanding Equipment, 43, 310
Sawing Machines, Band, 67, 87, 141, 215
Sawing Machines, Hack, Inside Front Cover, 82, 141, 345
Saws, Radial, 87
Saws, Slitting, 58
Saw Sharpener, 291
Screw Drivers, Power, 178, 221, 388
Screw Machine Parts, 317
Screw Machine Products, 205
Screw Machines, Automatic, 97, 179, 300
Screw Machines, Hand, 56-57
Screws, Cap, Set, Socket and Machine, 32D, 300
Screws, Transfer, 188, 296
Services; Milling, Grinding, Lapping, Rebuilding, Repairing, Business, etc., 179, 246, 264, 286, 294, 296, 339, 369
Shapers, 27, 35, 36-37, 271
Shearing Machines, 25, 373
Shears, Portable, 80
Shears, Throatless, 307
Shim Stock, 222
Slotting Machines, 36-37
Snagging Wheels, 177
Soldering Equipment, 349
Spacing Collars, 257
Special Tools, 183
Speed Reducers, 22, 260, 268
Spindles, Precision, 45
Spot Facers, 96
Springs, 205
Stamps, 253
Stamps, Rotary, 286
Stamp, Steel, 302, 345
Steel and Steel Stock, 134
Steels, 134
Stock Racks, 334
Stock Reel, 274
Stud Setters, 109
Superfinishing Machines, 11
Surfacers, 127, 152
Surfacing Machines, Bench, 338

Tables Dial Feed, 255
Tables, Elevating, 166, 343
Tables, Rotary and Index, 279, 343, 378, Back Cover
Tap Extractors, 170
Tapes, Measuring, 141
Tappers, 127, 253
Tapping Attachments, 15, 242, 327, 355, 373
Tapping Machines, 10, 69, 113, 308, 388
Taps, 78, 169
Thread Rolling Machines, 302
Threading Dies, 179
Threading Machines, 69
Tools, Cutting Off, 143
Tools, Portable, 194-195
Tools, Precision, 103
Tools, Threading & Boring, 304
Tote Pans, 348
Tracer Control, 53
Transmissions, 198, 220, 293
Tube Soldering Machines, 348
Tube Rolling Mill, 119
Tubing, Steel, 134
Turning Tools, 94
Turrets, Lathe, 165, 226, 309
Type Holders, 281

Valves, 51, 99, 155, 301, 343
Vernier Tools, 145
Vises, Bench and Machine, 28, 47, 82, 151, 222, 250, 267, 283, 304, 327, 335, 346

Washers, 342
Welding Equipment and Supplies, 1, 106, 163, 287, 366, 387
Wheels, Band Saw, 102
Wire Cutters, 274, 345
Wrench Sharpeners, 347
Wrenches, 4, 20, 76
Wrenches, Pneumatic, 20

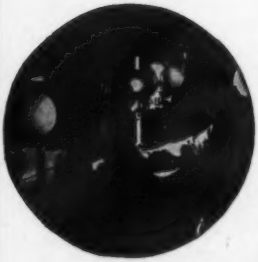
Rigid
MANUFACTURING
Controls

assure unsurpassed performance of

BUCKEYE BEARINGS

● Use of selected metals, and our exacting control of charging ratios, and melting and pouring temperatures, assure the production of uniformly high quality bearings. Each piece, month after month, measures up fully to our rigid specifications.

For easy assembly, and long, efficient, satisfactory service, specify Buckeye Bearings by brand name. Available in 1088 fully finished ready-to-use stock sizes—in cored and solid 13″ bars—in several graphited styles—also in any ID, OD and length; slotted, split, drilled or flanged exactly to your special blue-print requirements. No order is too big or too small for Buckeye. Let us quote on your requirements.



Buckeye

BRASS AND MANUFACTURING COMPANY

BRONZESMITHS SINCE 1900

6412 HAWTHORNE AVE. CLEVELAND 3, OHIO

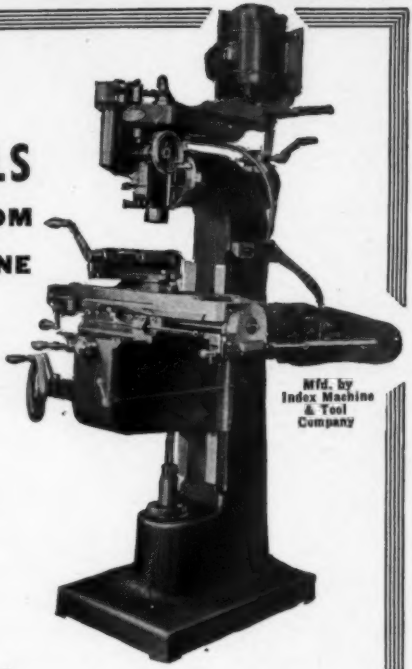
BRONZE SLEEVE BEARINGS · STANDARD SIZES OR TO CUSTOMERS' BLUEPRINT IN ANY RECOGNIZED BEARING METAL ANALYSIS

INDEX VERTICAL MILLS

FOR THE TOOL ROOM OR PRODUCTION LINE

For use with end mills ⅛" to 1" in steel. Equipped with verniers, as standard equipment in addition to micrometer dials on table actuating screws for locating. Further accuracy available with rods and indicators which can be furnished as extra equipment.

If you want speed and precision on milling, drilling and boring send for a catalog on Index Mills.



Mfd. by Index Machine & Tool Company

INDEX MILLS

Index Mills participated in all important war production programs from camera and guns to atomic bombs. Ask any owner how they like their Index Mill.

12" TOOL ROOM ROTARY TABLE

A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 12" size only.

Write to Factory Sales and Distributing Agents for complete information.

BLANK & BUXTON MACHINERY CO.

3100 E. MICHIGAN AVE.
JACKSON, MICHIGAN

NEW

SETS OF REAMERS

MORSE FINISHING REAMERS

1 to 5 Morse Hand Finishing Reamers.
5 to Set in Wooden Box

$7.00 Net

PIN TAPER REAMERS

0 to 10 Pin Taper Reamers, 11 to Set, in Wooden Box

$7.50 Net

HAND REAMERS

¼ to 1¼ Hand Reamers, 33 to the Set by 32nds,
in Wooden Box

$30.00 Net

VICTOR MACHINERY EXCHANGE, Inc.
251 Centre Street **New York City**
TELEPHONES: CAnal 6-5575-3494

PROMPT DELIVERY

COMBINATION CENTER DRILLS

Special Alloy and High Speed Steel

Regular Type

Ground with Radial Relief

Included angle 60 degrees. Other angles made special to order.

	DIMENSIONS			PRICE PER DOZEN	
				Semi-	
	Dia.	Drill	Length	H. S. Steel	H. S. Steel
Size	Body	Dia.	Overall	Net	Net
A-1	1/8″	3/64″	1¼″	2.50	7.20
C-2	13/64″	1/16″	1⅞″	3.00	7.20
D-1	15/64″	5/64″	2″	3.25	7.20
E-1	3/10″	3/32″	2⅛″	3.50	7.20
E-2	3/10″	1/8″	2⅛″	3.50	7.20
F-1	7/16″	5/32″	2¾″	4.50	10.80
F-2	7/16″	3/16″	2¾″	4.50	10.80
J-1	1/2″	7/32″	3″	.....	16.20
J-2	1/2″	9/32″	3″	.....	16.20
M-1	5/8″	7/32″	3¼″	.....	21.60
M-2	5/8″	9/32″	3¼″	.....	21.60
N-1	3/4″	1/4″	3½″	.....	28.80
N-2	3/4″	5/16″	3½″	.....	28.80

VICTOR MACHINERY EXCHANGE, Inc.

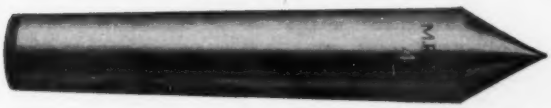
251 Centre Street **New York, N. Y.**

Phone: CAnal 6-5575

NEW

CARBON, HIGH SPEED & TUNGSTEN CARBIDE TIPPED

LATHE CENTERS



THESE CENTERS ARE GROUND AND HARDENED

Taper	Whole Length	Net Prices Carbon	Net Prices High Speed	Net Prices Tungsten Carbide Tipped
1	$3\frac{5}{16}$	$ .60 each	$1.55 each	$ 2.50 each
2	$4\frac{3}{16}$	.75 each	2.25 each	4.00 each
3	$5\frac{1}{4}$	1.25 each	3.25 each	6.00 each
4	$6\frac{3}{4}$	1.75 each	4.25 each	10.00 each
5	$8\frac{1}{2}$	3.50 each	8.25 each	14.00 each

NEW DRILL SLEEVES

WITH MORSE TAPER SHANK

	Net Prices
1-2 No. 1 hole and No. 2 Shank	$ .45 each
1-3 No. 1 hole and No. 3 Shank	.60 each
2-3 No. 2 hole and No. 3 Shank	.60 each
2-4 No. 2 hole and No. 4 Shank	.75 each
3-4 No. 3 hole and No. 4 Shank	.75 each
2-5 No. 2 hole and No. 5 Shank	2.00 each
3-5 No. 3 hole and No. 5 Shank	2.00 each
4-5 No. 4 hole and No. 5 Shank	2.00 each
4-6 No. 4 hole and No. 6 Shank	7.00 each
5-6 No. 5 hole and No. 6 Shank	7.00 each

VICTOR MACHINERY EXCHANGE, Inc.
251 Centre Street **New York City**
TELEPHONES CAnal 6-5575-3494

Index to Advertisers

Abart Gear & Mach. Co.....260
Abrasive Machine Tool Co.....33
Abrasive Products, Inc.....114
Accurate Bushing Company.....184
Ace Abrasive Laboratories.....318
Acme-Danneman, Inc.....311
Acme Diamond Tool Company.....320
Acme Industrial Company.....257
Acme Tool Co.....96
Acromark Co.....281
Acro Metal Stamping Co.....65
Adamas Carbide Tool Co.....332
Aget-Detroit Co.....42
Aircraft Machy. Co.....229
Airo Products Co.....219
Alco Tool Co.....86
Allen Co., A. K.....255
Allied Products Corp.....314
Almond Co., T. R.....325
Alofs Mfg. Co.....273
Amendola & Co., Michael.....266
American Diamond Tool & Gauge Co.....370
American Metal Products Company.....276
American Saw & Mfg. Co.....85
Anderson Bros. Mfg. Co.....249
Andersons, Inc.....264
Arguto Oilless Bearing Co.....197
Armstrong-Blum Mfg. Co.....Inside Front Cover
Armstrong Bros. Tool Co.....4
Arter Grinding Machine Co.....120
Atlantic Saw Mfg. Co.....68
Atlas Press Company.....27
Atrax Co.....329
Auto Moulding & Mfg. Co.....346
Avey Drilling Machine Co.....44

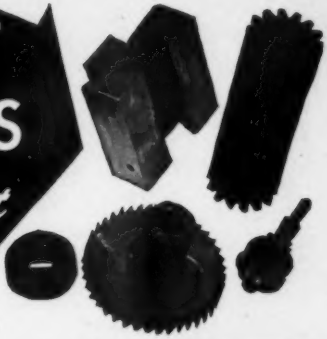
Baldor Elec. Co.....239
Baumbach Mfg. Co., E. A.....350
Bay State Abrasive Products Co.....177
Bear Mfg. Co.....210
Behr-Manning.....38
Benchmaster Mfg. Co.....49
Beverly Shear Mfg. Co.....307
Blank & Buxton Machinery Co.....378
Boyar Schultz Corp.....225
Bremil Mfg. Co.....352
Breuer Electric Mfg. Co.....228-275
Brewer Mch. Co., W. F.....313
Bridgeport Machines, Inc.....61
Brown Corp., W. R.....47
Brown Engineering Co.....283
Brown & Sharpe Mfg. Co.....145
Bryant Chucking Grinder Co.....89
Bub & Son, George F.....294
Buckeye Brass Mfg. Co.....377
Buffalo Forge Co.....25
Buffalo Mchy. Co.....321
Burg Tool Mfg. Co.....121
Burr & Son, J. T.....151
Busch Co., J. C.....200

Canedy-Otto Mfg. Co.....13
Carbide Tool Co.....371
Carboloy Co.....330
Carborundum Co.....132-133
Cardinal Machine Co.....157
Carroll & Jamieson Machine Tool Co.....350
Carter Products Co.....102
Center Scope Products.....202
Central Mch. Works Co.....198
Cerro-de-Pasco Copper Corp.....238
Chicago Drillet Corp.....223
Chicago Mfg. & Distributing Co.....8
Chicago Pneumatic Tool Co.....20
Chicago Rivet & Machine Co.....60
Chicago Tool & Engineering Co.....369
Chicago Wheel & Mfg. Co.....194-195
Childs & Co.....303
Cincinnati Electrical Tool Co.....388
Cincinnati Grinders, Inc.....6-7
Cincinnati Shaper Co.....77
Circular Tool Co.....58
City Machine Company.....277
Clemson Bros. Inc.....215
Cleveland Automatic Mch. Co.....46
Cleveland Twist Drill Co.....63
Clipper Belt Lacer Co.....285
Columbus Die, Tool & Machine Co.....286
Colwell Co., S. G.....309
Comet Tool Co.....304
Commander Manufacturing Co.....336
Comtor Co.....307
Cone Automatic Machine Co.....37
Conner Tool & Cutter Co.....373
Continental Tool Works
Div. of Ex-Cell-O Corp.....117
Conway Clutch Co.....217
Cooley Electric Mfg. Corp.....383
Cosa Corp.....95
Coulter Machine Co., James.....104
Criterion Machine Works.....90
Crystal Lake Grinders.....316
Cullman Wheel Co.....22-23
Curtis Universal Joint Co.....41
Cushman Chuck Co.....76

Dahlstrom Mfg. Co.....162
Danly Machine Specialties.....32d-55
Dayton Rogers Mfg. Co.....257
Dearborn Inc., Howard.....21
Dearborn, J. W.....367
Defiance Machine & Tool Co.....167
Detroit Die Set Corp.....34
Detroit Power Screwdriver Co.....178
Detroit Stamping Co.....354
Detroit Surfacing Machine Co.....310
Diamond Machine Tool Co.....105
Di Machine Corp.....385
Diehl Machine Works, G. M.....128
Dorman Machine Tool Wks.....242-355
Dreis & Krump Mfg. Co.....39
Drive-All Mfg. Co.....196
Durant Mfg. Co.....323
Dykem Co.....276

HEAT TREAT SMALL PARTS

In Your Own Plant



SAVE TIME AND MONEY

With these Versatile Cooley Furnaces

- One model to operate to 2000° F.
- One model, 2 sizes, to heat to 1850° F.
- Use for both hardening and tempering.
- Simple and economical to operate.
- Positive control over high and low heats.
- Uniform temperatures assure results.

Power Cost Less than 4 Cents per Hour

To hold 1600° F. in the MH-3 furnace requires less than 2 kw. At power rate of 2c per kw.-hr., operating cost is under 4c per hour. Cooley furnaces are easily installed, quiet in operation, and create no fumes or odors.

Profitable Uses for Cooley Furnaces

1. Hardening, drawing and tempering small batches.
2. Quickly normalizing and annealing small parts.
3. Convenient for high speed pre-heating.
4. Expedites emergency repairs.
5. Predetermining production heat treating technique.
6. Harden and draw in the same furnace with assured temperature control at either heat.

ESSENTIAL FOR TOOL AND DIE SHOPS

TWO NEW OPTIONAL FEATURES AVAILABLE

1. Counter Weighted Vertical Lift Door conserves heat where door need not be fully opened. Replaces hinged hearth door at $20.00 additional on MH-3, MH-4—standard on MH-5.

2. Heavy Gauge Steel Stand locates furnace at most convenient operating height and provides additional working and storage space. Add $35.00 to regular price.

THREE SIZES—MH-3, MH-4—1850° F. MH-5—2000° F.

Type	Chamber Capacity	Amps 115 V	Watts	Amps 230 V	Price
MH-3	8"W 6"H 14"L	29.6	3400	14.8	$146.00*
MH-4	10"W 6"H 18"L	.....	4500	19.6	$222.50*
MH-5	8"W 6"H 14"L	.....	4800	20.9	$340.00*

*All furnaces complete with Hearth Plate.

Automatic Control—Indicating Controlling Pyrometer—Thermocouple and lead wire—approximately $150.00.

FREE!

HEAT TREATING HELP

Our experience in heat-treating is available to you. State your problem . . . write for Bulletin No. 56 today—no obligation. No salesman will call.

COOLEY ELECTRIC MANUFACTURING CORP.
36 South Shelby Street Indianapolis 7, Indiana
INDIANAPOLIS MACHINERY EXPORT CORP.
Export Manager, 44 Whitehall Street, New York, New York

Eastern Tool Supply Co.....199
East Shore Machine Products Co.....156
Economy Mch. Products Co.....300
Economy Tool & Machine Co.....218
Edlund Mchy. Co.....213
Edroy Products Co.....371
Edler Engineering Co.....106
Electro-Matic Products Co.....88
Electro-Mechano Co.....305
Elgin Tool Works.....56-57
Enco Manufacturing Co.....165
Errington Mechanical Laboratory.....253
Esco Engineering Corp.....344
Etna Machine Co.....119
Ettco Tool Co.....125

Fakes & Co., Jos. B.....342
Falcon Tool Co.....126
Federal Foundry Supply Co.....274
Federal Press Co.....304
Fellows Gear Shaper Co.....123
Fenn Mfg. Co.....18
Firth-Sterling Steel & Carbide Corp.....149
Flexrock Company 214
Ford Mfg. Co., M. A.....306
Formsprag Co 242
Fostoria Pressed Steel Co.....98
Fulflo Specialties Co.....361

Gairing Tool Co.....282
Galland-Henning Mfg. Co.....155
Gallmeyer & Livingston Co.....Inside Back Cover
Gardner Machine Co.....66
General Die & Stamping Co.....368
General Eng. & Mfg. Co.....35
Genesee Mfg. Co., Inc.....54
Giddings & Lewis Machine Tool Co.....19
Gilman Engineering & Mfg. Corp.....296
Gisholt Machine Co.....31
Gits Brothers Mfg. Co.....362
Gorton Machine Co., Geo.....53
Govro-Nelson Company 26
Graham & Co., John H.....16
Graham Mfg. Co.....250
Grant Mfg. & Machine Co.....280
Gray Mills Corp.....275
Greaves Machine Tool Co.....287
Greenerd Arbor Press Co.....284
Greenfield Tap & Die Corp.....24
Grob Brothers 280
Grobet File Co. of America.....83-281-349
Gruen Gauge Company.....327

Hall Mfg. Co.....340
Hamilton Tool Co.....166
Hammond Machinery Builders.....32-332
Hardinge Brothers, Inc.....
Hart Machine Co.....251
Harvey Mfg. Corp.....269
Haskins Co., R. G.....290
Heim Co. 70
Heimann Mfg. Co.....188
Hilliard Corp. 240
Hobart Brothers Co.....1
Hoggson & Pettis Mfg. Co.....253
Horberg Gage Co.....74
Horis Screwlock Co.....342
Howe & Son, Inc.....292
Humm Safety Equipment Co., John.....274
Hypro Tool Co.....78

Ideal Tool & Die Co.....327
Independent Pneumatic Tool Co.....79
Industrial Products Suppliers.....222
Ingersoll-Rand 107

J. & S. Tool Co.....116-279-333
Janette Mfg. Co.....268
Jarvis Co., Chas. L.....15
Jefferson Machine Tool Co.....226
Johnson & Sons, Wm. C.....262
Johnson Gas Appliance Co.....258
Johnson Machine & Press Corp.....314
Jones & Lamson Machine Co.....191

Katolight 241
Kennametal, Inc. 326
Kingsbury Machine Tool Corp.....17
Knu-Vise Inc. 28

L. & J. Press Corp.....345
L-W Chuck Co.....82
Lafayette Tool & Supply Co.....279
Larkin Lectro Products Co.....366
Lassy Tool Company.....292
Leach Machinery Co., H.....84-347
Leckinger Machine & Experimental Co.....308
Lee Co., K. O.....93
Lenox Instrument Co.....212
Lewthwaite Machine Co., T. H.....345
Libert Machine Co.....373
Lima Electric Motor Co.....48
Lincoln Electric Co.....163
Lincoln Park Mfg. Co.....262
Linderme Machine & Tool Co.....372
Linley Brothers Co.....235
Littell Machine Co., F. J.....343
Logan Engineering Co.....32a
Lovejoy Flex. Coupling Co.....220
Lucas & Son, J. L.....348
Luma Electric Equipment Co.....349
Lyon Machine Co.....301
Lyon-Raymond Corp. 234

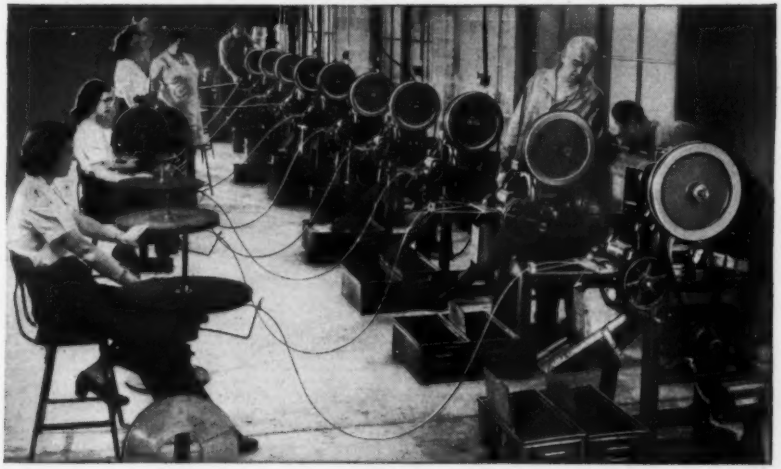
M. B. Products Co.....339
McMahon Co., Frank.....289
Machine Products Corp.....319
Madison-Kipp Corp. 324
Mall Tool Company.....221
Martin Machine Works, J. E.....304
Master Products Industries.....347
Maveg Inc., Machine Sales Association.....365
Maxwell Co. 259
Mead Specialties Co.....164
Meyers Co., W. F.....161
Michigan Chrome & Chemical Co.....291
Michigan Drill Head Co.....349
Midwest Tool & Engineering Co.....343
Miller Knuth Mfg. Co.....345
Millers Falls Co.....103
Milwaukee Chaplet & Mfg. Co.....331
Modern Motor Drives Div.
(Nichols Eng. Co.).....335
Modern Tools 267
Modern Tool Works.....109
Molins Ind. Diamond Co.....298
Moline Tool Co.....367
Moore Industries, J. C.....347
Motor Tool Mfg. Co.....92
Mummert-Dixon Company 344

National Acme Co.....179
Nelco Tool Co.....14
New Albany Machine Mfg. Co.....295
New Britain Tool & Mfg. Co.....151

PRODUCTION PLUS!

OVER a million stampings per day with this battery of

DIEBEL Hi-Speed 550 R.P.M. AUTOMATIC PRESSES



THESE 10 PRESSES OCCUPY ONLY 12 FT. x 45 FT.

The speed of this automatic press—it's adjustable up to 550 strokes per minute!—has resulted in soaring production records over a period of years in hundreds of plants. Diebel Hi-Speed Automatic Presses, like those above, have performed wonders on steel, brass, phosphor-bronze, fiber, plastics, rubber and paper.

May we send you our illustrated circular? It's yours for the asking—an introduction to the solution of your light blanking and forming problems.

DI MACHINE CORP.
DIVISION OF DIEBEL DIE & MFG. CO.
2712 West Irving Park Road Chicago 18, Illinois

New Method Steel Stamps, Inc.....345
New Milford Carbide Tool Co.....349
New Plastic Corp.....241
Nichols Eng. (Modern Motor Drives).....335
Nicholson & Co., W. H.....301
Nicholson File Co.....147-159
Nielsen, Inc. 347
Nielsen Tool & Die Co.....296
Norgren Co., C. A.....75
Norton Co.....32b-c
Numberall Stamp & Tool Co.....286

Oliver Instrument Co.....31
O'Neil-Irwin Manufacturing Co.....50
Orlandi Gear & Machine Co.....9

Paddock Tool Co.....236
Park Sales Co.....317
Peck Spring Co.....205
Plunket Machine Co., J. E.....346
Pope Machinery Corp.....45
Porter-Cable Machine Co.....152
Portman Machine Tool Co.....247
Potter & Johnston Mch. Co.....115
Pratt & Whitney.....169
Procunier Safety Chuck Co.....113
Production Machine Co.....338
Prutton Machine & Tool Co., D. H.....10
Pyrometer Instrument Co.....337

R & L Tools.....94
Racine Tool & Machine Co.....99
Reading Machine Co.....288
Redmer Air Devices Corp.....52
Reich Mfg. Co., J. R.....326
Reltool Corp 12
Rivett Lathe & Grinder, Inc.....2
Robbins Eng. Co.....Back Cover
Rockford Clutch Div.....251
Rockford Machine Tool Co.....36-37
Roofe Machine Works 62
Ross Operating Valve Co.....51
Rotor Tool Co.....43
Rouse & Co., H. B.....247
Rusnok Tool Works.....365
Rutland Tool Service.....246
Ryerson & Son, Inc., Jos. T.....134

S & E Machine Products.....203
S & S Machine Works.....343
Sales Service Machine Tool Co.....193
San Angelo Foundry & Machine Co.....325
Sanford Manufacturing Co.....341
Schauer Machine Co.....273
Scherr Co., George.....209
Schmarje Tool & Engineering Co.....300
Schmidt Inc., Geo. T.....363
Schultz & Anderson Co.....335
Screw Machine Specialty Co.....300
Seneca Falls Machine Co.....71
Sentry Co 375
Service Machine Co.....187
Severance Tool Industries.....322
Sheldon Machine Co.....271
Siewek Tool Co.....108
Simonds Abrasive Co.....40
Simonds Saw & Steel Co.....59
Simonski Gilbert S.....112

Size Control Co.....30
Slater Co., Paul B.....326
Snow Mfg. Co.....69
Sossner 302
South Bend Lathe Works.....130
Specialty Equipment & Machinery Corp.....328
Speed-Drives, Inc. 73
Spiral Mfg. Corp 369
Springfield Machine Tool Co.....64
Standard Gage Co.....233
Standard Transmission Equipment Co.....293
Stanley Works 80
Staples Tool Co.....183
Stark Tool Co.....259
Starrett Co., L. S.....141
Stokerunit Corp. 211
Stow Mfg. Co.....232
Strand & Company, N. A.....269
Strand Manufacturing Co.....182
Sturdimatic Tool Co.....110
Sundstrand Machine Tool Co.....227
Sunnen Products Co.....72
Super Tool Co.....101
Swedish Gage Co. of America.....333
Syntron Company 186
Syracuse Special Machine Co.....348

Tannewitz Works 67
Taylor & Fenn Company.....118
Taylor Mch. Co.....339
Teeter, C. B.....222
Thomas Hoist Co.....267
Thriftmaster Products 189
Tomkins-Johnson Co. 111
Torit Manufacturing Co.....124
Trindl Products, Ltd.....387
Troyke Mfg. Co.....343
Twoco Products Co.....287

U. S. Electrical Tool Co.....127
U. S. Hoffman Mchy. Corp.....100
U. S. Press & Tool Co.....371
United Precision Products Co.....176
Universal Engineering Co.....373

Vanderwall Co., E. H.....300
Vascoloy-Ramet Corp. 91
Victor Machinery Exchange.....379-380-381
Vimco Mfg. Co.....334
Vonnegut Moulder Corp.....256

Wade Instrument Co.....304
Waldes Kohinoor, Inc.....29
Walker-Turner Co. 87
Walls Sales Corporation.....312
Walton Co. 170
Wardwell Mfg. Co.....363
Weldon-Roberts Rubber Co.....237
White Dental Mfg. Co., S. S.....143
Whitney Metal Tool Co.....335
Willey's Carbide Tool Co.....160
Wilson, K. R.....81
Wirth & Son, Carl.....289
Wittek Mfg. Co.....122
Woodson Tool Co.....180
Woodworth Co., N. A.....171-337
Wyzenbeek & Staff, Inc.....185

Yost Mfg. Co.....335
Yohe Supply Co., Wm. S.....334

PROFITABLE WELDING

WITH *Easy to Operate*

TRINDL SUPER INDUSTRIAL ARC WELDERS

FOR PRODUCTION CONSTRUCTION MAINTENANCE AND REPAIR

A Range of Models for Every Welding Job!

"JOB-TESTED" TRINDL WELDERS, outstanding in the welding field because of the Simplified Operation and Ruggedness of Design and Construction, are unbeatable for practical efficient low cost operation. TRINDL WELDERS, preferred for general industrial, farm and automotive production, construction, maintenance and repair, are available in a range of models for every type of shop or welding job.

Dependable Trindl Welders, Welding Supplies and Accessories are Available to Save You Both—Time and Money...

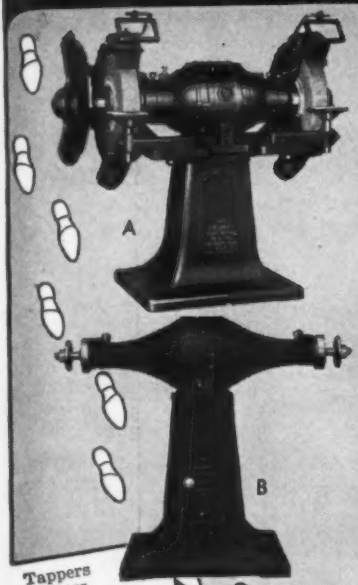
Write, wire or phone today for particulars, catalogs

Jobber and Distributor Inquiries Invited

Write for Selected Distributor Plan

TRINDL PRODUCTS LTD., 17 E. 23rd St., BC, Chicago 16, Ill.

In Step WITH MODERN PRODUCTION REQUIREMENTS



Engineered for maximum efficiency, economical operation. THE CINCINNATI Electrical Tools help you *Keep In Step* with modern production requirements . . . deliver more and better work.

A BALL-BEARING PEDESTAL GRINDER—Designed and built for continuous production work and all general purpose grinding. Sizes: ¼ to 15 H.P.

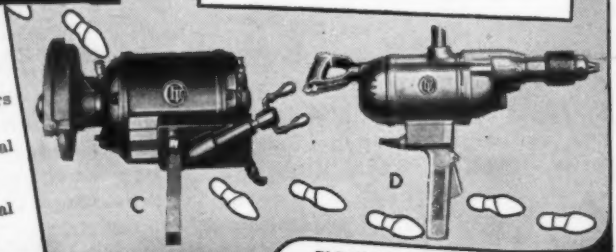
B BUFFING AND POLISHING LATHE—Especially designed, ruggedly built, for continuous service under most severe conditions. Sizes: ½ to 15 H.P.

C TOOL POST GRINDER—With or without feed, especially adapted for grinding lathe centers, cutters, reamers, rolls, dies, etc. Can be used in shaper or planer for surface grinding. Sizes: ⅛ to 1 H.P.

D BALL-BEARING ELECTRIC DRILL—For general maintenance work in industrial plants, small shops of all kinds. Sizes: ¼ to 1¼ inches.

Write today for complete details.

Tappers
Routers
Nut Setters
Speed Lathes
Screw Drivers
Electric Drills
Aerial Grinders
Tool Post Grinders
Abrasive Cut-Off Machines
Bench and Pedestal Buffers
Air Master Dust Collectors
Bench and Pedestal Grinders



The Cincinnati

ELECTRIC DRILLS · GRINDERS
BUFFERS · PORTABLE TOOLS
AIR MASTER DUST COLLECTORS

THE CINCINNATI ELECTRICAL TOOL CO.

Division of THE R. K. LeBLOND MACHINE TOOL CO.

2620 MADISON ROAD . . . CINCINNATI 8, OHIO

WELL INFORMED ENGINEERS . . . Specify

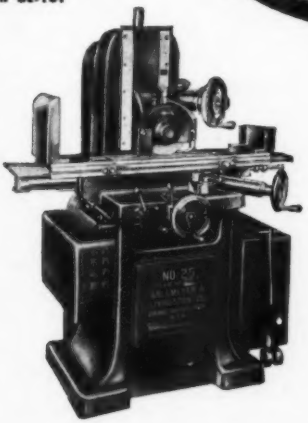
● Every Grand Rapids Grinder, large or small, has every essential feature for fast, efficient, low-cost production.

For the manufacturer of small sized products, Grand Rapids No. 25 and No. 4 Grinders will solve the Tool Room grinding problems on dies and cutting tools. Grand Rapids Grinders are built in many sizes for many grinding jobs.

GRAND RAPIDS GRINDERS

No. 25 Grand Rapids Hydraulic Feed Surface Grinder

Complete information in Bulletin GL-101



● No. 4 Grand Rapids Universal Cutter and Tool Grinder

Complete information in Bulletin No. 1048

hat "GRAND RAPIDS" Quality Means:

& L cast their own close-grained gray iron, achine all parts to micrometric tolerances, nd precision-assemble grinding machinery unsurpassed performance. ***Grand Rapids*** eans ***top*** quality in grinding machinery.

ALLMEYER & LIVINGSTON CO., 405 STRAIGHT AVE., S.W., GRAND RAPIDS 4, MICHIGAN

A STANDARD MACHINE

WITH THESE

3 Advantages

LOWER INITIAL COST

LOWER MAINTENANCE

EASILY ADAPTED TO SPECIAL PURPOSE OPERATIONS

THE *Robbins*

Nº 3 Drillmatic

Built as a standard machine to unit—designed specifically for sp cial purpose adaptations at low cost, the No. 3 Drillmatic eliminat design time for the basic machi and reduces the cost of building Further, it may be economical converted to new operations as p duction requirements change.

Incorporating many new feature the No. 3 Drillmatic is the res of 17 years experience designi and building special machine It's just the answer for single a multiple drilling, reaming, tapping or boring operations. There is probably a good applicati for it in your plant now!

SELF CONTAINED HYDRAULIC SYSTEM

Entire hydraulic system in compact unit. No outside piping or valves . . . no leaks. Two separate adjustable rates of feed. Wide variety of speeds by changing gears within unit or V-belt pulleys.

LIFE TIME SADDLE MOUNTING

Saddle has large diameter bars which slide in guide bushings on oversize machine column. Guide bars and bushings are hardened and ground alloy steel . . . automatically lubricated. Saddle is actuated by hydraulic r directly above work, further reducing fricti on guide bars.

Complete details of construction and ope tion contained in illustrated catalog availab without obligation. *Write to Robbi Engineering Company, 318 Midla Avenue, Detroit 3, Michigan.*

R E

ENGINEERING COMPAN

PRODUCERS OF **ROBBINS MAGNA-SINE • ROBBINS UNIV-AN ROBBINS SINE PLATE • ROBBINS INDEX TABL ROBBINS No. 3 DRILLMATIC • SPECIAL MACHINE**